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AND OF THE

INSTITUTIONS IN UNION.

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No. 52. FRIDAY, NOVEMBER 18, 1853. Vol. II.

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FIRST ORDINARY MEETING.

WEDNESDAY, NOVEMBER 16th, 1853.

THE First Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 16th instant, Harry Chester, Esq., Chairman of Council, in the Chair.

The following Institutions have been taken into Union since the last meeting of Council:—

300. Birmingham, Polytechnic Institution.
301. Bradford (Wilts), Literary Institution.
302. Buntingford, Literary Institute.
303. Coalbrookdale, Literary and Scientific Institution.
304. Derby, Railway Literary Institution.
305. King's Lynn, Free Library.
306. Market Drayton, Society for the Acquirement of Useful Knowledge.
307. Portsea, Watt Institute.
308. Preston, Literary and Philosophical Institution.
309. Stourbridge, Mechanics Institution.

Mr. CHESTER, as Chairman of Council, then read the following

ADDRESS.

In the circulars by which this meeting was convened, it was announced to the members of the Society that Captain Owen would deliver the address which the bye-laws require to be read by the chairman of the council, at the opening of a new session.

It is much to be regretted that, since the issue of the circulars, Captain Owen has been constrained by the pressure of duties elsewhere, to resign the post of chairman. At the request of my colleagues I have undertaken to do the best that I can to supply his place. The difficulties which, under any circumstances, I must have felt in accepting the office of chairman of the council of this Society, are greatly increased by the special character of the present session, and by my being called upon, at short notice, and with very little leisure, to come before you with an address which ought to have been prepared by some member of the Society more experienced in its affairs, and more familiar with the subjects of arts, manufactures, and commerce, than I am.

The first point to which your attention must be directed is the epoch which the life of the Society has attained. Its one hundredth session is now opened.

In three letters published anonymously in 1721, proposals were made for the establishment of a society, to be called "The Chamber of Arts, for the preserving and improvement of operative knowledge, the mechanical arts, inventions, and manufactures." In 1748 Benjamin Franklin published his "Proposal for the Improvement of Useful Knowledge among the British Plantations in America," by the formation of a society at Philadelphia, to be called "the American Philosophical Society," of which he volunteered to act *pro tempore* as secretary. These publications appear to have produced a strong impression on the mind of the originator of our society. They are entered at length in his handwriting in the Society's first minute book: and the schemes of the three institutions are very similar.

The "public spirit" of William Shipley, who is said to have been a drawing master, and brother to the Bishop of St. Asaph, "gave rise to the Society" of Arts, Manufactures, and Commerce, in 1753. Mr. Shipley first obtained the approval and concurrence of Jacob Viscount Folkstone, of Robert Lord Romney, and of Dr. Isaac Maddox, Lord Bishop of Worcester; and then proceeded to enlist others.

The first meeting of the Society was held on the 29th of March, 1754, at Rawthmell's Coffeehouse, in Henrietta-street, Covent-garden.—There were present—Lord Folkstone, Lord Romney, the Bishop of Worcester, the Rev. Dr. Stephen Hales, John Goodchild, Esq., Messrs. Laurence, Baker, Crisp, Brander, Short, and Messiter, and Mr. Wm. Shipley himself, who acted as secretary. They put forth this "ADDRESS TO THE PUBLIC:"

> Some of the nobility, clergy, gentlemen and merchants, having at heart the good of their country, have lately met together in order to form themselves into a society for the encouragement of arts, manufactures, and

commerce, in Great Britain, by bestowing rewards from time to time for such productions, inventions, or improvements, as shall tend to the employing of the poor, to the increase of trade, and to the riches and honour of this kingdom, by promoting industry and emulation; and, though at present their plan is not complete, yet it has, nevertheless, been resolved to make a beginning in manner following—viz., for cobalt, madder, and drawings, &c.

The meetings continued to be held at Rawthmell's until the 10th of January, 1755, when Peele's Coffee-house was resorted to. That place of meeting being "found inconvenient," a house in Craig's-court, Charing-cross, was taken by Mr. Shipley, "expressly to accommodate the Society," and the first meeting held there was on the 5th of March, 1755. In 1756 larger apartments were engaged at Mr. Fielding's, in the Strand, opposite to Beaufort's-buildings; and on the 12th of October, 1774, the Society assembled for the first time in this building in the Adelphi, which was erected for the Society by the Brothers Adam, on the site of Durham-house, the residence of the Bishop of Durham.

Viscount Folkestone was elected first president on the 5th of February, 1755, and occupied the presidential chair until his decease in 1761. Lord Romney was president from 1761 to 1793; the Duke of Norfolk from 1793 to 1815; His Royal Highness the Duke of Sussex from 1815 to 1843, when the Society had the houour of electing as its president Her Majesty's Consort, His Royal Highness Prince Albert, than whom it may justly be said—

"Nemo est primarum artium magis princeps."

In 1847 the Society was incorporated by royal charter for "bestowing pecuniary and honorary rewards for meritorious works in the various departments of the fine arts, for discoveries, inventions, and improvements in agriculture, chemistry, mechanics, manufactures, and other useful arts, for the application of such natural and artificial products, whether of home, colonial, or foreign growth and manufacture, as appear likely to afford fresh objects of industry, and to increase the trade of the realm, by extending the sphere and operations of British commerce."

To give you even a tolerable idea of what the Society has done, since the twelve worthies before-mentioned were first assembled at Rawthmell's coffee-house, on the 29th March, 1754, would be to relate the history of arts, manufactures, and commerce, of ideas, designs, discoveries, inventions, and industries from that time to the present. You will probably be satisfied to receive a brief enumeration of some of the Society's operations, and of some of the subjects for which prizes were offered or awards made.

At the first meeting before mentioned, three sets of rewards were offered—1st, 30*l.* for the production of cobalt found in England; 2nd, 30*l.* for madder grown in England; and 3rd, "15*l.* each for the best drawings by boys and girls under fourteen years of age."

Great attention was bestowed upon the promotion of what were then called "the polite arts." Among the most distinguished of the British artists who have received the Society's honorary rewards are Nollekens, Bacon, Flaxman, Sir Thomas Lawrence, Sir William Ross, Edwin Landseer, Allan Cunningham, Mulready, Wyon, Millais, &c., &c. Cosway, the painter, received the first prize ever awarded, when he was only fifteen years of age. Nollekens is said to have derived important assistance from the countenance and patronage of the Society. Sir W. Ross, who subsequently received many rewards, obtained his first prize in 1807, when he was only twelve years of age, for a drawing of Wat Tyler.

The Society did much to excite among the nobility and gentry a knowledge and love of art. Among other measures adopted for this purpose, gold and silver medals were offered for the best and second-best drawings, of any kind, by young gentlemen, the sons and grandsons of peers or peeresses, and by young ladies, the daughters or granddaughters of peers or peeresses. Many of these medals were claimed and received. Similar medals and money awards were given for drawings by the sons and daughters of commoners of the higher, middle, and lower classes. In many of these cases the maximum of age was fixed at fourteen, sixteen, or eighteen years; in others, no limit of age was declared. Particular encouragement was held out to young persons who were desirous of becoming artists; and great stress was laid, at an early period, upon the application of art to the improvement of design in manufactures. Nor were the materials and mechanical appliances of art forgotten by the Society of Arts. It put forth many suggestions of desiderata; offered many rewards, and rewarded many inventions and improvements in that direction. The reputation acquired by artists whose works were seen and criticised in the Society's rooms, before and after adjudication, occasioned an application to be made for an exhibition to be held in the large room. This was granted, gratuitously, for several years, and the first public exhibition of the works of British artists in the metropolis was held at the Society's House in the Strand, in 1760; and "hence arose," it is said, "the annual exhibitions of the rival artists." Indeed it appears that the Royal Academy sprang from the Society of Arts; for the minute-book contains a complete scheme for the establishment of the Academy; and that scheme expressly refers to the example of this Society.

In 1776 the Society proposed to the members of the Royal Academy, which had been instituted in 1768, that they should paint the Great Council-room, where we now are, and be remunerated by the public exhibition of their works therein. The

Academy, with Sir Joshua Reynolds at its head, refused this proposal; but, in the following year, Barry, who had signed the refusal with the rest, volunteered to decorate the room without any remuneration at all. The "Handbook of London" states that when he made his offer he had but sixteen shillings in his pocket. His offer was accepted, and you see the result.

The reclaiming of bogs and fens, and of land from the sea; the planting of wastes; the introduction of useful and ornamental trees and plants; and the improvement of agriculture and horticulture, have been from first to last promoted by the Society with great zeal and success. Immense plantations of oaks, firs, larches, alders, chesnuts, and other trees are due to its efforts. The premium lists are full of notices of such objects as these: The cultivation of hemp; the introduction of foreign grasses, and of roots for food for cattle; the improvement of agricultural implements—the encouragement of drill husbandry, drill ploughs, drain ploughs, and scarificators, horsehoes, root-cutters, strawcutters; the benefits of bone manure; the analysis of soils; irrigation, water meadows, tanks and carts for collecting and distributing liquid manures—all these occur before 1790. In 1783 we have the following offer of a reward "for inventing a machine to answer the purpose of mowing or reaping wheat, rye, barley, oats, or beans; by which it may be done more expeditiously and cheaper than by any method now practised; provided it does not shed the corn or pulse more than the methods in common practice, and that it lays the straw in such a manner as may be easily gathered up for binding."

All kinds of arts, sciences, and manufactures have been encouraged and improved. To show how very wide in its scope this Society has been, and at the same time how practical and suggestive, I will enumerate a very miscellaneous list of objects for which rewards have been offered:—Improvements in dyeing, tanning, tapestry weaving, spinning, lacemaking, designs for weavers, embroiderers, and calico printers by boys and girls under seventeen; for papermaking, sextants, gun-harpoons, sawmills, quadrants, miscroscopes; for encouraging poor operatives to improve the processes in which they were engaged (under this head many substantial rewards have been given to the poor weavers of Spitalfields and Bethnal-green), also for life-boats, all kinds of improvements in shipbuilding and architecture; for accurate maps of the counties; for artificial mothers of chickens, locomotive fire-engines, pumps, rising door-hinges, beet-root sugar, carding machines, "factitious cotton," made from refuse of hemp, also called "flax cotton;" to commercial schoolmasters for teaching French, German, and Italian; surgical instruments, drugs, culinary improvements, hydrometers, locks, time-pieces; machines for teaching arithmetic, music, needle-work, and writing to the blind; to Captain Bligh for introducing the bread-fruit into the West Indies; for an universal standard of weights and measures, &c. &c. In short, the objects are innumerable, and of every possible kind.

The total amount distributed in premiums and bounties exceeds considerably the sum of 100,000*l*. Medals were first given, on the motion of Mr. Baker, in 1756. The first gold medal, which was designed and presented to the Society by Flaxman, was awarded, in 1758, to Lord Folkestone, "for eminent services;" and the first silver one was presented, in 1757, to Lady Louisa Grenville "for a drawing."

The Society's transactions, as distinguished from the books of premiums and prize-lists, were first published in 1783. Only the first fifty volumes, up to 1836, are indexed. It is much to be desired that the whole series should be indexed by some competent person. It contains an immense amount of highly interesting matter, and I cannot but think that if the contents were more generally known some patents would be seen to have been granted on insufficient data.

For many years the Society promoted the improvement of our fisheries, and the supply of the metropolis with fish by land-carriage. The large fish-carts that used to travel, at what was thought a tremendous pace, from the coast to London, were the result of rewards offered by this Society.

To improve the trade and commerce of the colonies; to introduce into them useful trees, plants, and animals, and also manufactures, trades, and useful arts, has always been a great object with the Society.

The Society has taken an active part in improving our postal system—domestic, colonial, and international; in exposing unjust and injurious monopolies, fiscal restrictions, and laws damaging to trade and commerce; in collecting trade-reports and statistics in connexion with arts, commerce and manufactures; in advocating a decimalization of weights, measures, coins, and accounts; in amending the laws of partnership; in promoting education in art and science.

The Free Economical Society of St. Petersburg was established in 1786, upon the model and in consequence of the success, of our Society.

Many of the institutions of the United Kingdom are indebted to the Society of Arts for the first kindling of the interest which led to their establishment. Wisely and rightly the governing body of this Society has always rejoiced when the interest which it has laboured to excite in any object has become sufficient to justify the establishment of a separate Society, which, by a more exclusive attention to that object, might be expected to produce more important and useful results. As an example of what has been done in this way, I need only specify the formation of the

Photographic Society, which was founded within these walls, at the conclusion of our late Exhibition of Photography, the first of its kind that has ever been held in this country.

Our first regular exhibition of useful inventions appears to have been held in 1761, when a Mr. Bailey attended for seven weeks, for a payment of 10*s.* 6*d.* a day, to explain the models and other articles to all comers.

In 1756 one, and in 1757, eight, standing committees were appointed. From that time to 1851, the number of those committees varied exceedingly; but at the latter date the present establishment of thirty standing committees, founded on the classification used at the Great Exhibition of the Industry of all Nations, was happily adopted. There are now four classes for raw materials; six for machinery; ten for textile fabrics; nine for metallic, vitreous, and ceramic manufactures; and one, with four sub-classes, for fine arts. In addition to these standing committees, special committees for occasional or temporary purposes are frequently appointed by the council.

It is unnecessary for me to remind you of the distinguished part which was played by the Society in reference to the Great Exhibition. It is sufficient to state that the exertions of this Society prepared the public mind for the idea of the Exhibition; that here originated the connexion between our illustrious President and the other founders and conductors of that wonderful enterprise; that it was first announced to the world by his Royal Highness as President of the Society of Arts; and that almost every name which is familiar to our memories as having had a very important share in the glories of that greatest work of these times is to be found on the roll of our members.

The Indian portion of the late Exhibition at Dublin was collected at the instance of this Society, and was intended to be exhibited here. It was transferred to Dublin at the suggestion of his Royal Highness the President.

It has been already intimated that the operations of the Society of Arts have not been confined to these islands. From the very outset the colonies of Great Britain have received a large share of attention.

On the 18th of August, 1756, the following record was entered:—" A letter from Benjamin Franklin, Esq., dated Philadelphia, November 27, 1755, was read, wherein he mentions he should esteem as a great honour to be admitted a corresponding member of this Society; and though it is not required that corresponding members should bear any part of the expense of the Society, yet he desires he may be permitted to contribute twenty guineas, to be applied in premiums."

Many other eminent persons have been corresponding members in the colonies and in foreign countries throughout the century; but it was not until the session of 1851-2 that our colonial correspondence was placed on its present very important footing. A special committee was then appointed for the purpose "of making the Society useful in advancing the knowledge of the resources and capabilities of the numerous British colonies in all parts of the world, and in furnishing the colonies themselves with such information as may be required on subjects connected with arts, commerce, and manufactures." The committee took measures to establish a correspondence with similar societies in the larger colonies, and with committees of correspondence in those colonies where no such societies exist. The co-operation of the Colonial Office was solicited, and promptly accorded; and the results have been highly valuable. The 44th number of the JOURNAL contains a very important communication, received through the Colonial Office, from the New Zealand Society on the subject, particularly of the *Phormium tenax*, or New Zealand flax. This communication is referred to merely as a specimen of the kind of correspondence which the Society now carries on with the colonies. See also the 49th JOURNAL on the subject of the Long-haired Angora Goat, and the 40th and 49th numbers respecting certain substitutes for Gutta Percha. It will be remembered that the last-mentioned substance was introduced into this country by the Society of Arts; and that the first specimen ever received is deposited in our Museum.

It is not only beyond these islands, however, that we have extended our commuuications and our means of usefulness. In the United Kingdom we have entered into an alliance, for mutual benefit, with 309 independent institutions. The resolution to establish the union of institutes was passed under the happy auspices of Lord Lansdowne's presidency, on the 18th of May, 1852. It was established in the summer of that year; and has for its object, on the one hand, to raise the institutions, on the basis of perfect local freedom and self-government, to a position of power and utility which, isolated and centreless, they could scarcely attain; and, on the other hand, to secure for the Society of Arts the powerful cooperation of numerous and widely-spread bodies of intelligent, locally-influential, and public-spirited men.

Such, very imperfectly presented, is the venerable but vigorous Society of Arts, Manufactures and Commerce.

The bye-laws require that at the commencement of each annual session the chairman of the council shall declare the policy which the council will adopt during his year of office. This duty I shall now endeavour briefly to discharge.

It will probably be thought right that some special demonstrations should celebrate our first

centenary, but it would best be signalized by more than ordinary fruits of utility in our ordinary proceedings; by extending and consolidating our resources and means of action, by large additions to our roll of members; by a marked improvement of our valuable journal; and by the acquisition of premises more suitable to our present condition than these which we have completely outgrown.

The inheritance of our predecessors is accepted by the council of the current year. We shall endeavour to carry on with good vigour what has been commenced with good judgment; and, at our retirement, to leave behind us some things that may be worthy of record. We shall not think it necessary to pursue the very objects that William Shipley pursued. He was particularly anxious to promote the growth of madder; but we think it not at all needful in these days to take extraordinary measures to make the world grow *madder*. We hope, however, to do some things that Shipley and his coadjutors would have gladly seen done.

The council will continue to develop the union of institutions, and the foreign and colonial correspondence. The council will carefully consider the results of the Exhibition at Dublin, with a view to their profitable use. The Society of Arts feels a deep interest in the success of the intended Exhibition at Paris, and desires that therein the arts, manufactures, and commerce of the United Kingdom and its dependencies may be fully and honourably represented. The council will do what it can to promote this object. The council will readily assist the promoters of provincial exhibitions which may be held in connexion with any of the associated institutions. The efforts of the Society will be continued to procure an amendment of the Law of Partnership; to prepare the mind of the public for the adoption of a decimal system of weights, measures, coins, and accounts; and to abolish those taxes, *e.g.* the Duties on Paper, which are specially injurious to arts, commerce, and manufactures.

The quinquennial Swiney prize, of 100*l.* sterling, contained in a goblet of the same value, (designed by Mr. Maclise, R.A.) will be adjudged by the council, in January next, to the author of the best published work on Jurisprudence—attention being particularly directed to that branch of Jurisprudence which relates to arts and manufactures.

Those applications of Science and Art by which the well-being of our poorer brethren who labour in our towns, villages, fields, mines, and ships, may be promoted by the improvement of their houses, clothing, food, fuel, instruction, amusement, and health, are deeply interesting to this Society, which has long since recognised their importance, and perceived many of their bearings upon the prosperity of those interests which we are chartered to promote. By the merciful arrangements of Providence, our interests, rightly understood, are always in harmony with our duties; and we have much cause to be thankful that this truth, in relation to the health and homes of our brethren, is now peculiarly obvious. The council will not neglect its grave admonitions. The progress of mechanical invention, and the applications of machinery to arts, manufactures, and trades, and to the uses of daily life, are now more important than ever. The forthcoming report of Mr. Whitworth, on the Manufacturing and Mechanical Industries of America, is anxiously expected by the council. The well-known competency of the author, and the vital importance of the subject, will secure the fullest attention to his work. The reports of the other Commissioners on the Exhibition at New York, will, doubtless, be of great value.

The "strikes" which afflict the manufacturing districts are regarded by the council with deep regret. The Society feels an equal interest in the well-being of the masters and men. Experience of the past evils of former strikes is found insufficient to prevent their recurrence Its sad lessons must be again and again learned; but it may be hoped that, when we have a real education of the people, these lamentable spectacles may be no more seen; and it is worth conjecturing whether, when education is improved, an amendment of the law of unlimited liability, and the introduction of partnerships *en commandite*, by placing the men in the position of masters in such partnerships, might not have some effect towards restraining workmen from taking up, as such, a position which is inconsistent with the essential conditions of mastership, and has an inevitable tendency to destroy the means of employment. You have seen that in its first century the Society of Arts has been an active promoter of education—I hope that, in this respect, our second century will be no discredit to its elder brother. The council is thoroughly convinced that an improved education for the whole people, rich and poor, adult and child, is the first requisite for the improvement of manufactures, commerce, and arts; that a liberal measure of science must enter into that education; and that it is the duty of this Society to promote vigorously this great object. We shall not involve the Society in any religious or political controversies; but we shall lend a helping hand to make education industrial, scientific, and practical.

In the pursuit of this purpose, we ought to be powerfully aided by the associated institutes. We rely on them for cordial, energetic, and continuous aid. It is important that they should continue to do what they do at present; but they might do it better and do more. They generally lament that

they are unable to maintain in efficiency their classes for systematic instruction. The council is of opinion that the mechanic, artisan, or labourer, has at present no sufficiently obvious inducement to pursue continuous studies in his local institute. His previous education has not prepared him for it. There is little or no emulation to incite him; there are no examinations to test his progress, no certificates or diplomas to record it, no present and tangible rewards for his success. Wanting such encouragements the youth who, after his daily work, purely for the love of knowledge, pursues it in regular attendance at his institute, is a hero of no mean order, and such youths are not abundant in any class of society. It is hoped that during the present session the council may be able to establish a system whereby examinations may be held in several districts, and certificates of progress and attainments, and possibly prizes, may be awarded to the class-students of the institutions in union with the Society of Arts. It is hoped also that an exhibition of educational apparatus, foreign as well as British, may be opened when the present very interesting exhibition of "useful inventions" is closed.

The time will not allow me to particularize any of the articles in the present exhibition, and indeed it would be a work of supererogation to do so; for, though we have not engaged Mr. Bailey at 10*s.* 6*d.* a day to explain them, we have the pleasure of seeing here the major part of the exhibitors themselves; and they, doubtless, will give explanations of their own inventions. A full explanatory catalogue is also provided. The Prize List for the present session has been very carefully prepared by the Secretary, in communication with the standing committees. In this list the wants and capabilities of the colonies, as well as of the United Kingdom, have been attentively considered. Some of the premiums offered are suggestive that articles now imported from foreign countries might advantageously be produced in the colonies. Others point to the opening of fresh sources for the supply of materials for our manufactures, and for facilitating processes in the arts. Our textile manufactures have made rapid progress of late years from the frequent introduction of new substances—*e. g.* Alpaca—from which good or useful articles of attire have been produced at low prices. Other premiums again point to the utilization of substances, such as peat, refuse coal, imperfect coal, refuse ores, slag, &c. Why should British India use only the seed of the flax plant (*Linum usitatissimum*), and let its valuable fibre rot in the soil? Why should Australia export only the wool of the sheep, and boil down the carcasses merely for fat? Is it impossible to preserve the flesh and to export it in a satisfactory condition to this country, where butcher's meat is not overabundant? Again, some of the premiums have reference to such developments of our famous mechanical skill as may be applicable to the further saving of human labour in manufactures, trades, and households, *e.g.* the sewing machines, the washing machines, &c. We have offered no premium for a shaving machine, but we are quite ready to reward one, if it can be used by men with ordinary nerves. The premiums for the meteorological instruments were suggested by the report of the Conference at Brussels. It is desirable that the Society should hold an exhibition of meteorological instruments.

We hope to have attractive and useful meetings on the Wednesdays of this session. The following subjects of discussion have been determined on:—"Gold Crushing and Pulverizing," "Consumption of Smoke," "Ventilation of Collieries," "Sewing Machines," "Manufacture of Carpets," "Gas and its applications to domestic uses." We hope, also, to have a good discussion on "Patents," that the subject may be fully elucidated; and that measures may be taken to procure such amendments of the law as may be deemed requisite.

And now, apologising for having detained you so long, I will conclude by reminding you that, as the council is only the executive of the mind and will of the Society, it is to the members of the Society that we must look for the maintenance of its high position. The council will do its best; but we hope that you will aid us by increasing the number of subscribers, by taking part in discussing, both here and in the JOURNAL, those subjects with which experience has rendered you familiar in arts, manufactures, and commerce; and by aiding us generally in the Society's works. To the members of the standing committees I venture to make a particular appeal. It is very much, indeed, to be desired that they would furnish us with an annual report on the condition, progress, wants, and capabilities of those arts, manufactures, or trades to which the committees have reference, and also with short occasional communications on points of special interest. The JOURNAL would be greatly enriched by the shorter documents; and the annual reports, simultaneously presented by all the committees, would form a volume of vast interest and no slight national importance.

Mr. W. TOOKE, F.R.S., proposed, and Mr. MURCHISON seconded, a vote of thanks to the Chairman, for the address he had read, which was carried by acclamation.

The SECRETARY announced that at the meeting of Wednesday, the 23rd instant, the following paper would be read, "On Machines for Pulverizing and Reducing Metalliferous Ores," by Mr. Geo. F. W. Stansbury.

EXHIBITION OF INVENTIONS.

The Fifth Annual Exhibition of articles of utility invented, registered, or patented, during the last twelve months was opened on Wednesday last. Notices of this Exhibition will appear in the Journal from time to time.

LONG-HAIRED ANGORA GOAT.

The following Report has been forwarded to His Royal Highness Prince Albert, in reply to the inquiry received, through the Board of Trade, from the Swellendam Agricultural Society at the Cape of Good Hope. This communication was published in No. 49 of the Journal, page 593. It will be remembered that the object of the inquiry was to ascertain how far the statements which had been brought forward by Captain Conolly, in the Journal of the Royal Asiatic Society, and by Mr. Thomas Southey in his work on Colonial Sheep and Wools, might be relied on; and that in the event of satisfactory replies being received, efforts would be made with a view to the importation of a flock of Angora goats into that colony, and the export of their wool to the mother country:

REPORT.

The Council of the Society of Arts have much pleasure in reporting, for the information of his Royal Highness the President, that on the receipt of the documents from the Swellendam Agricultural Society, they immediately entered into correspondence with the leading brokers and manufacturers importing, or using Angora goats' wool (called "tiftik" or "filik" in that country, and "mohair" in Great Britain), and that the following is the substance of the communications with which they have been favoured. It is proposed to deal with the questions *seriatim*, and then to make such general remarks as have been elicited in the course of this inquiry.

"In reply to the first question, Whether a breed of goats exists in Angora bearing only one description of hairy covering of a silken fineness, which can be annually clipped? the answers have invariably been in the affirmative. It would appear that this wool or hair has a peculiar glossy, soft, slippery feel, is white in colour, and grows in staples or locks, so that it is somewhat curled and wiry. The shearing takes place annually, and the process is perfectly simple, the fleece being of pretty uniform length and quality from the root to the point or apex. The average length of the staple is from five to six inches. It is said that it has sometimes been clipped twice in the year, when the market value has been high, but it is thus rendered much less valuable, length of staple being required.

"As to the second question, Whether such fleece is purchased in Europe as it comes from the goat's back, and without requiring the expensive picking process which Cashmere or Thibet, or other shawl-wools containing an underdown must undergo? it is said that Angora goats' wool is perfectly free from 'underdown'—unlike the Thibet or Cashmere, which has a downy covering on the pelt, with long coarse hairs or kemps at the top, the separation of which is both tedious and expensive. It is packed in bags and shipped as it comes from the animal's back; occasionally (but which is in all cases recommended) a few of the coarse locks at the skirting are taken off at the time of shearing and packed separately. Locks, or pieces of grey, which are trifling in amount, and are easily separated, should be taken out where they occur. On the other hand it is asserted that washing is necessary, as there is a prevalence of "burrs" or seeds in the wool, which "burrs" are a disparagement, but not very serious, unless they are excessive in quantity. It is also imported in the whole fleece. On its reaching this country, and before putting it to the combing machinery, it has to be assorted and classed by our manufacturers, according as their purposes may require. This has to be done with all our home-grown wool, and the process costs but little more in the one case than in the other. In sorting mohair about one-sixth part is taken out which is too short in the staple and not applicable for combing purposes; and in the process of combing about one-fifth part is made into what is technically termed 'noils;' these together are bought by woollen manufacturers, from which they make cloth of different kinds and other materials.

"With respect to the third question, What the value of such fleeces would be per pound? it would seem that the present value is about 2*s.* 3*d.* per pound. During the last four years it has varied from 1*s.* to 2*s.* 8*d.* per pound, the average over that period being about 1*s* 8*d.* per pound.

"In reference to the fourth question, Whether any large quantity of it would be required by the European manufacturers? it is said that there has been a greater demand for this article for some years past than our imports could supply, and these have amounted on the average of the last four years to about two and a half million pounds. As a proof of this it is asserted that for a long period it has been sold by the Greek merchants without the buyer having a chance of seeing his purchase beforehand, the buyer's only protection being the assurance of the seller that it shall be of good merchantable quality. This fact goes far to show how extremely desirable it would be to increase the production, as it must undoubtedly be limited in its employment by the impossibility of obtaining a sufficient supply, no less than by the difficulties and impediments in the way of getting the present limited one. The spinning of this article has now become an extensive and steady trade. Ten or fifteen years ago it was found that the yarn spun by English machinery was very superior to Turkish hand-spun yarn, so that about that period nearly all spinning in Turkey ceased; and this, no doubt, will account for the falling off in the export of mohair-yarn in 1837 as compared with 1836. We now import the raw material—the wool—and export it again in a partially-manufactured state, as yarn. On account of the present scarcity of mohair, and its consequent dearness, quantities of goods are made from English wools as an imitation, and passed off to the consumer as genuine. Although the price may be subject to a little fluctuation, as the material is principally used for fancy fabrics, and though the limited quantity produced has kept it up for the time, there seems to be little doubt that the parties engaged in the trade have so established it, that it will not only continue but increase, and especially if the price is kept moderate—say from 1*s.* 6*d.* to 1*s.* 9*d.* per pound.

"For a time mohair was chiefly used for the list ends of woollen cloths, and commanded little attention; but for some years past it has been greatly gaining in favour for the fancy trade. Formerly it was used for thick heavy fabrics, as coatings, shawls, &c.; but recently it has been almost exclusively wrought up in plain and fancy worsted stuffs, and other lighter articles for female attire. The yarn is generally spun at Bradford and Norwich, and the great bulk of it is used for the manufacture of Utrecht velvet, a material which is now largely employed for decorative purposes, and for the linings of private and railway carriages. Utrecht velvet is now manufactured on a limited scale at Banbury and Coventry, but the chief seat of the manufacture is in France and Germany, especially the former, to which countries the yarn spun in England is exported. Plush and lace are also made from it, and recently it has been introduced into the manufacture of a cheap imitation of black silk lace, now so generally worn, for which, from its glossy silky appearance, it is well calculated. Yarn composed of mohair and natural coloured alpaca mixed together, in various shades,

is also largely used in the Bradford trade, in the manufacture (with cotton twist warps) of an immense variety of materials for ladies' dresses, gentlemen's summer coats, &c. It is also extensively used both alone and in combination with silk, for making a description of goods called lustres, tabinets, and fringes.

"There are several distinct breeds of goats in Angora and the surrounding districts, as well as the one which produces the mohair wool, which is larger than the ordinary goat. The wool of one is called "cambello," and is of a brown colour, short and downy underneath, with long coarser hairs at the surface of the fleece. The import of this wool from Turkey is irregular, perhaps 5,000 pounds one year, and none the next. The value has varied during the last four years from 7d. to 1s. 5d. per pound, and it is now worth from 1s. to 1s. 2d. per pound. The value is uncertain and the demand depends entirely on fashion. There is another description of wool which is obtained from the ordinary goat. Its colour is mostly grey, brown, and black, but seldom white. It partakes somewhat of the nature of Thibet, only it is much coarser. It is close and fine, full at the bottom of the staple, with long coarse hairs mixed and growing through it. Its present value is 6½d. per pound. It is only suitable for very low-priced carpetings, &c.

"Up to this point the information furnished by our different correspondents has been almost identical; but here we have to record a great diversity of opinion, on a branch of the inquiry on which after all the whole question depends—the probability of naturalising or acclimatizing the Angora goat in the Cape Colony, or indeed in any other country but its own.

"Mr. Geo. Shaw Pollock (Liverpool) 'thinks the Angora goat might be located with success and great advantage at the Cape of Good Hope." Messrs. R. M. Scholefield and Co. (Liverpool). 'suppose that the Cape colonists could not do better than naturalize the animal there.' Mr. Titus Salt (Bradford) 'highly approves of the plan proposed by the Swellendam Agricultural Society. He considers that the propagation of the Angora goat should be promoted as much as possible. He has long thought that we had colonies suitable for its propagation, and if it should be found that they can be acclimatized at the Cape, he is persuaded the scheme proposed would be a very profitable investment. In February 1852, Mr. Salt ordered from Angora one male and two female goats; they arrived in Bradford last December. They have had young ones and are doing well. The hair is of a beautiful quality. The old ones have been clipped this year, and the second coat has not in the least degenerated. Mr. Salt has therefore sent to Angora for a further supply.' On the other hand Messrs. W. Greame and Co. (Liverpool) say 'that as regards Angora goats' wool, or mohair, we may at once inform you from the best information, gathered from parties from that quarter, that, from an extraordinary peculiarity of the animals in that locality, there is no probability of their being transported to other regions with any chance of success, for, when removed even 50 or 100 miles only from their immediate locality, the wool degenerates and loses the soft silky character which constitutes its chief value. Under these circumstances we can hold out no hopes of succeeding in the views suggested by the Agricultural Society at the Cape of Good Hope. It would appear from the same authority also that this peculiarity is not confined to the goats, but that even the cats are subject to the same change when removed from that locality, and they account for it as being some atmospheric action only peculiar to that district.' Messrs. Hughes and Ronald (Liverpool) say that 'some attempts have from time to time been made to introduce the breed into other parts of Asia Minor, but the quality and character of the wool has been found soon to retrograde. The want of success may, we think be chiefly attributed to the little care, attention, and encouragement, ever bestowed in that country on any measure of useful progress or improvement, and the total absence of all energy or enterprise; besides, in many parts of Asia Minor a weed or "burr" is found to exist very generally, which is very detrimental to the wool. From all the information we are possessed of, we have great confidence that the fine Angora goat might be successfully introduced, and would thrive well on the table-land at the Cape of Good Hope. It is a hardy animal. We would, however, suggest as desirable, to send out at first with the animals a few shepherds who are accustomed to their habits.'

Mr. Titus Salt 'considers that not only the Angora goat, but the Alpaca is an animal particularly worthy the attention of the government with a view to its propagation in our colonies. Mr. Salt has a flock of Alpacas (about a dozen); they have been bred in the neighbourhood of Bradford, and no difference is perceptible between the foreign and the English clip. The animals only require to be kept from wet; cold does not injure them. They require housing in this climate, and no doubt would thrive well in a dry elevated temperature. There might, however, be some difficulty in obtaining them, as those imported are smuggled over, the government of Peru having passed a law prohibiting their exportation, in consequence of some person who had a correct notion of their value having some years ago shipped off 300 to England, of which, however, only six survived the voyage. Alpaca wool is now 2s. 9d. per lb." Messrs. John Foster and Son (Bradford) also say that "if this animal (the Alpaca) could be introduced into the Cape or Australia, it would be of great benefit to the grower, as well as to the manufacturer.' Mr. George Shaw Pollock (Liverpool) likewise confirms this opinion, and says that, 'the Alpaca is a hardy, graceful animal, and would, he presumes, thrive on the bleakest mountain lands, either at the Cape or in Great Britain.' Messrs. R. M. Scholefield and Co. (Liverpool) say that, 'there is also an animal called the Vicuna, in South America, which the Cape climate would suit, and the wool from which is worth 6s. to 7s. per pound.'

The Council of the Society of Arts are anxious to avail themselves of this opportunity of expressing their readiness to undertake the collection of evidence and information on all matters affecting the material progress of this country and her dependencies. They believe that in the British possessions in various parts of the world, there are many substances as yet unknown to commerce, which might be beneficially employed in the arts and manufactures, and they conceive that it is in the highest degree important that wherever the supply of any particular raw material falls short of the demand, the greatest publicity should be given to the fact, so that colonists and others may thereby be led to inquire whether it be possible to find or rear any substitutes for the same in their own immediate localities. It is extremely desirable that no occasion should be lost in studying and making known the rude and primitive methods of the natives themselves, as it is by the publication of such statements that the attention of individuals in other countries, where the arts have attained to a greater pefection, are led to apply their knowledge and experience to the improvement of the mechanism and processes adopted in less civilized states.

The Council have to thank the following gentlemen for the ready manner in which they responded to their communication:—Messrs. Armstrong and Bercy; Mr. Edward Barstow; Messrs. Buchanan, Browne, and Co.; Mr. Edmund Buckley; Messrs. Abram Gartside and Co.; Messrs. Greame and Co.; Mr. James Haley; Messrs. Hughes and Ronald; Messrs. Law and Wylie; Mr. George Shaw Pollock; and Messrs. R. M. Scholefield and Co.; all of Liverpool. Messrs. John Foster and Son, and Mr. Titus Salt, of Bradford; and Messrs. E. and R. W. Blake, and Mr. George Jay, of Norwich.

"(By order)
"P. LE NEVE FOSTER,
"SECRETARY."

PARLIAMENTARY PAPERS.

FREQUENT inquiries having been made with respect to the distribution of parliamentary papers amongst the different Literary, Scientific, and Mechanics Institutions, the readers of the JOURNAL are informed that the resolutions of the Parliamentary Committee which sat last year on this subject, cannot be carried into effect until they have received the sanction of the House of Commons.

Owing to the illness of Mr. Tufnell, the chairman of the committee, the discussion on the resolutions was necessarily postponed, but the Council have authority to state that it is Mr. Tufnell's intention to take the earliest opportunity, on the meeting of Parliament, to bring forward the resolutions of the committee; and, as they were adopted unanimously, it is hoped that the House will not hesitate to sanction them. When this has been done, the committee which must then be appointed will proceed without delay to decide upon the distribution of parliamentary papers.

ON CIDER AND PERRY MAKING.

COMMUNICATED BY T. W. BOOKER, ESQ., M.P.

At the recent Agricultural Meeting at Ledbury I made a few remarks on the production of Cider and Perry, which induced some of my constitutents, there assembled, to seek a conversation with me afterwards on the subject, during which they requested me to "write another letter," with special reference to the proper season for gathering the fruit and the mode of managing the fermentation of the liquor. If the remarks which I have to make shall awake due attention on the part of the cider and perry producers of our country, I feel convinced of this, that, to use the words of one who wrote on the subject two hundred years ago, Dr. John Beal, a Fellow of the Royal Society, "these parts of England will be some hundreds of thousands of pounds sterling the better for it."

That the whole subject may be before us, I will beg you to copy the following, which is a reprint from the *Bath Chronicle*—a newspaper having extensive circulation in the Cider Counties of the West of England, the editor of which copied it from the *Hereford Journal*, and struck it off for gratuitous distribution, and to whose obliging courtesy I am indebted for the copy I send you:

"CIDER.—T. W. Booker, Esq., M.P., recently addressed a letter to the *Hereford Journal*, stating that his relative. Mr. Blakemore, of the Leys, Herefordshire, had, sometime before, conversed with a German Baron, who has large estates on the banks of the Rhine, where hock and other celebrated wines are produced, and that the Baron said that many sorts of the Herefordshire apples were capable of producing as valuable and desirable a beverage as the hock grapes, if a different process of making the liquor were adopted. The result of the Baron's observations is contained in the following extracts from Mr. Booker's letter:—

"'Our liquors,' said the Baron, 'after the fruit is pressed, are strained, so as to separate the coarse muss from the liquor, which is then put into large vessels, when shortly afterwards fermentation commences. This fermentation we watch with the utmost care and attention, considering that upon it everything depends connected with the future quality and richness and value of the wine; in the course of a few days, the finer muss that remains in the liquor after the straining above alluded to, drops to the bottom, and the liquor becomes perfectly clear and transparent, retaining all its original saccharine matter, with all its strength, richness, and flavour. At this critical period, upon which we consider the quality of our wines depend, we adopt the process of racking. This racking must be effected in such a manner as to prevent any part of the liquor coming into contact with the atmospheric air; should it do so, fresh fermentation, in all probability, will take place, and by the same means, the like causes repeated will operate and be followed by the same results—repeated fermentation—until the flavour and richness of the original liquor are destroyed, and the liquor, instead of becoming wine, would become as worthless as your inferior cider.'"

"The reason for this Rhenish caution (writes Mr. Booker) in preventing the liquor from coming into contact with the atmospheric air during the process of racking, is this. The first fermentation is what is termed vinous fermentation, and results in the liquor subjected to it becoming wine; if repeated fermentations are allowed to follow. they are what are termed acetous fermentations, and they result in the liquor parting with its vinous and saccharine properties, and imbibing acid or acetous ones, and it is converted into vinegar. Now the atmosphere is the laboratory from which the liquor absorbs the chemical agent which produces these distinct and separate fermentations.

"And now practically to apply these observations. One fermentation is all that is wanted to convert the juice of the apple into wholesome cider.

"The plan to ensure this which I recommend is as follows:—First—Grind the apples in the cider-mill, and squeeze the juice from the pulp, as is done at present. Second—Run or pour the liquor, after being squeezed or strained, into a vat, capable of containing three or four or even more hogsheads. This vat must be placed in an elevated position, at least five or six feet above the floor, to admit the hogshead or cask, in which the liquor is to be ultimately secured, to be placed under it. At the bottom of the large vat let there be a hole of from one-and-a-half to two inches in diameter, for the purpose of a tube being passed through this hole into the hogshead or cask under it. This tube or pipe should be of a sufficient length to pass through the muss or sediment which deposits itself in the large vat, and to reach at least six inches above it into the clear liquor, and it should be of sufficient length to pass through the hogshead or cask placed below or under the vat, into which the liquor is to be passed, nearly to the bottom. While this process of fermentation is going on, the top of this tube should be corked or plugged up. When the liquor in the vat has dropped fine, the cork or plug being withdrawn, the process of racking commences and is accomplished, and the fine liquor will run from the large vat through the tube into the hogshead or cask placed under it, the liquor retaining all its original saccharine qualities.

"And now the work is done; and the result will be found to be a liquor wholesome and palatable, full of spirit, richnesss, and flavour, and of value proportioned to the descriptions or sorts of apples which are cultivated in our orchards. My own firm conviction is, that the difference in value, in the market, of all the cider produced in Herefordshire by these simple means, over and above that produced by our present careless and slovenly means, would amount to many tens of thousands of pounds

a year, and would be so much clear gain and profit to all those who make cider, to say nothing of the health and pleasure of those who drink it."

Since I wrote the foregoing, I have been favoured by a highly-valued and intelligent friend of mine, resident in our county, with the following admirable "Treatise on Cider-making:" it was written many years ago for the Farmers' Club at Ross, and is so comprehensive, and full of the most practical information, and, moreover, gives it in so much better language than any I can use, that I feel I cannot do better than place it before the public.

"The production of good cider must depend upon the description of fruit of which it is made, the season, and state of the apples when they are crushed, and the management of the juice whilst it is fermenting. It will therefore be proper to consider the subject under these three heads separately.

The kind of Apple which makes the best Cider.

"The acid which gives the peculiar quick and sharp feeling upon the palate in good cider, having first been noticed in the apple, although it exists in many other fruits, has been termed the malic acid. It may not be too much to say, that it is the due combination of this acid with saccharine matter, namely, the sugar of the apple, properly fermented, which is the object to be aimed at in the manufacture of cider. In the selection of the fruit will depend the proportion of malic acid contained in the liquor. The crab has a much greater quantity of this acid than the cultivated fruit; and, generally speaking, in proportion as we obtain sweetness by culture, we deprive the apple of its malic acid.

"Hence it follows that some delicious table fruits will not make good cider; this rule, however, is not invariable, as the golden pippin and some other fine apples appear to contain the proper admixture of acid and sweetness which is desirable in the liquor. Mr. Knight recommends that the different sorts of fruit be kept separate; and considers that only those apples which are yellow, or mixed with red, make good cider; and that the fruit of which the flesh or rind is green, are very inferior. He recommends that the apples should be perfectly ripe—even mellow, but never decayed—before they are crushed.

"There was a curious manuscript written by Dr. John Beale, a fellow of the Royal Society in 1657, upon the subject, of which the following are extracts:—'Crabs and wild pears, such as grow in the wildest and barren cliffs, and on hills, make the richest, strongest, the most pleasant, and lasting wines that England yet yields, or is ever likely to yield. I have so well proved it already by so many hundred experiments in Herefordshire, that wise men tell me that these parts of England are some hundred thousand pounds sterling the better for the knowledge of it.' He mentions of these kinds of austere fruit the Bromsbury crab, the Barland pear, and intimates 'that the discovery of them was then but lately made, yet they had gotten a great reputation.' He adds, 'the soft crab and white or red horse pear excel them and all others known or spoken of in other counties.' Of the red horse pear of Felton or Longland, he says, 'that it has pleasant masculine rigour, especially in dry grounds, and has a peculiar property to overcome all blasts.' Of the quality of the fruit he observes, 'such is the effect which the austerity has on the mouth on tasting the liquor, that the rustics declare it as if the roof of the mouth were filed away, and that neither man nor beast care to touch one of these pears, though ever so ripe.' Of the pear called rinny winter pear, which grows about Ross, in that county, he observes, 'that it is of no use but for cider; and that if a thief steal it, he would incur a speedy vengeance, it being a furious purger; but being joined with well chosen crabs, and reserved to a due maturity, becomes richer than good French wine; but if drunk before the time, it stupifies the roof of the mouth, assaults the brain, and purges more violently than a Galenist.'

"Of the quality of the liquor he says, 'according as it is managed, it proves strong Rhenish, Barrack, yea, pleasant Canary, sugared of itself, or as rough as the fiercest Greek wine, opening or binding, holding one, two, three, or more years, so that no mortal can say yet at what age it is past the best. This we can say, that we have kept it until it burn as quickly as sack, draws the flame like naptha, and fires the stomach like *aqua vitæ*.' Thus there appears a great difference between the opinions of these two men, who probably paid more attention to the subject than any others; and the question naturally arises, is the cider and perry of the county as good or better than it used to be, after greater attention has been paid to the orchards? I am decidedly of opinion that it is inferior; and it was this impression which caused me to venture to call your attention to the subject. If such be the case, it is a great object to ascertain what has caused the deterioration in the liquor. I believe it is for want of a due proportion of the peculiar acid which is found in the greatest quantity in the wild fruit; and beg to suggest whether it would not be worth while to try back, and mix a certain quantity of crabs with the fruit before it is crushed.

The best time of the year for making Cider.

"It has been before observed, that Mr. Knight recommends the fruit to be perfectly ripe, even mellow, before it is crushed, and this can only happen late in the autumn. As it is known to be more difficult to manage the fermentation of the liquor in warm weather, it is usual to defer making cider till November or December; if, however, the liquor can be put in a cold cellar after the first fermentation is over, I am of opinion that it might be commenced earlier. The juice of unripe fruits ferments more quickly than of that which is ripe, and contains more malic acid. Where there is the convenience of a good underground cellar, the difference of temperature between that and the outward air is greater in moderately warm weather than in November; so that if the liquor were fermented under sheds, as Mr. Knight recommends (and his instructions as to the management of the cider whilst fermenting are excellent), and, as soon as fine, removed into the cold cellar, the change of temperature would be greater at the end of September than in November, and this would probably tend to prevent the liquor fermenting again. If the new cider cannot be removed, from the warmth of the atmosphere, there can be no question that it is better to defer the making till the weather becomes cool.

Fermentation of the Juice.

"The researches of scientific men, although very elaborate, have done very little in throwing light upon the nature of fermentation; it appears to partake, in a measure, of the vital principle, of the phenomena attending which we know nothing. Many curious and interesting facts have been discovered during the investigation, but none of which appear to be of much use in the making of cider. There are three kinds of fermentation, or rather there are some products which pass regularly through three stages of fermentation, viz., the vinous, the acetous, and the putrescent. Other substances pass at once to one or other of the latter stages; gum and water turning to vinegar without forming any spirit, and meat at once putrefying. It is not desirable that the vinous fermentation should be complete in the manufacture of cider, in which case all the sugar of the apple would be converted into spirit; this never does happen without a portion of vinegar being also formed, the acetous fermentation going on conjointly with the vinous, as when cider frets a great deal it may be very strong, but is comparatively of little value, having lost all its richness and become sour. The vinous fermentation stops naturally before it has run its course, and it is the object of the maker to avail himself of this property in the liquor, and to endeavour to prevent any secondary fermentation taking place; the number of schemes which have been suggested to prevent which, showing that it is the most important point to be attended to in the manufacture of good cider,

I am of opinion that the 100-gallon cask is much better than larger, and that the liquor is not only more easily managed, but more likely to be good; it may be that cider in large casks becomes stronger, but not so frequently rich as in single hogsheads. Although it may not be apparent, fermentation commences as soon as the juice is expressed from the fruit; and the sooner the cask is filled and allowed to remain quiet, the more regular and certain will be the process. What should we think of the brewer who, whilst his beer was working, brewed another quantity, and added the raw wort to the first? Yet this is constantly done in filling a large cask with cider; or even worse, for the apple juice is added cold, whereas the wort might be mixed with the beer whilst warm. It would be greatly better to keep the liquor in open tubs, till enough be obtained to fill the cask, and then to put it together at once.

"If I may be allowed to suggest an experiment, there is one use to which I should be very glad to see a large cask applied; that is, to fill it partly with *fresh* muss, and the remainder with boiling water—the probable result would be a very pleasant and useful liquor. Temperature has much to do with fermentation, and it would be an advantage to have two cellars, one much colder than the other. If the liquor, upon pitching fine, were racked in a clean cask and put into a cold cellar, there would be much less risk of its fermenting again. I should recommend no other liquor to be added to it; but, in order to prevent ullage, that it should be racked into a smaller cask;—the less air admitted the better, and if the cask be sound and iron-bound it may be better to close it at this time.

"The application of cold will check fermentation immediately. I have seen liquor in a state of froth boiling out of a large jar, suddenly reduced to a state of quiescence by pumping upon the side of the jar. This fact induced me to cause an experiment to be tried at Gayton during a very bad season for the cider making, the weather being very warm; a cask of juice was rolled into a brook of cold water, and sunk by stones attached to it; it remained in that position till nearly Christmas, and was so much better than any other made that year that Mr. Newman obtained double the price for that hogshead he did for any of the rest. Perfect stillness is very desirable, as motion is found to excite the acetous fermentation. A bottle of wine, attached to the sail of a windmill in motion was, after three days, converted into vinegar, although closely corked. When a second fermentation does take place in cider, there is very little hope of its being rich and good.

"In such case, I should recommend its being drawn out into tubs, exposed to the cold as much as possible; and after being thus flattened, put back into the cask, at the same time well stirring up the whites of fifteen or twenty eggs, previously mixed up with a portion of the liquor; if this succeeds in fining it, which probably it will, it may then be racked into a clean cask, and closed as much as possible from the air. It is probable that a great deal of mischief is caused by some principle of fermentation remaining in the cask; this might be prevented by well scalding the casks before they are filled; or, what I think would be better, by washing out the casks with clear lime water. One large piece of lime put into a hogshead of water, and allowed to settle, would answer the purpose. Some brimstone matches burned in the casks would have a tendency to prevent fermentation.

"I shall not say much upon the mode of crushing the apples and pressing out the juice, having had so little practical experience; but I have always thought that if the fruit were crushed between wooden rollers, and allowed to drain before being put under the stone, the process would be much expedited; as the apples sometimes roll before the stone a long time before they are broken.

"In Ireland they use a press formed by a lever, which might be made at less expense than with a screw, and be more quickly worked: it is impossible the pressure can be too light at first, and it should be increased gradually as the liquor runs from the muss. Two sets of bags, allowing one to drain for some time without pressure, would be an undoubted advantage.

"E. P."

I need not, I think, add one word to the advice here given. I earnestly hope it will be followed, and sure I am that we shall all feel and acknowledge the value of it, in the improvement in quality, and increase in value, of our county beverage.

I have been asked by hundreds whether it is really the fact that during each visitation of that awful scourge, the Cholera, which has again appeared among us, not a single case has ever yet occurred in Herefordshire: my reply has been *that it is so: I shall be glad to be corrected if I am wrong:* if I am right, the knowledge of this cannot be too widely circulated, nor can our thankfulness be too great to the Almighty Being who has so singularly and signally blessed and protected us.

PREPARED COFFEE-LEAVES.

Mr. Daniel Hanbury has just presented to the Society a sample of prepared coffee-leaves. Mr. Hanbury, in an article communicated by him to the *Pharmaceutical Journal*, thus details their qualities, quoting further information from Mr. M. Ward, of Padang, extracts from whose letter he inserts:

The existence of caffeine in the leaves as well as in the berries of the coffee-plant has attracted some attention, and a project for substituting them for those of the tea-plant has been actually devised by Dr. John Gardner, of London. According to this gentleman, the leaves require to be subjected to a certain process of preparation before they are used. What this process is I am unable to state; but specimens of the prepared coffee-leaves were placed by Dr. Gardner in the Great Exhibition of 1851, together with the caffeine extracted from them, since which time advertisements have appeared in the Ceylon papers soliciting tenders for the supply of coffee-leaves by the ton.

Whether these advertisements have met with a response I know not, but in March last my attention was drawn to a letter signed "*An Old Sumatran*," published in the *Overland Signapore Free Press* for January 3rd, 1853 This letter, which was reprinted in the *Pharmaceutical Journal* for March (vol. xii. p. 443), states, that on the western side of the island of Sumatra an infusion of torrified coffee leaves is of universal consumption among the inhabitants; so much so indeed, as to be regarded as one of the very few necessaries of life. *

Upon applying to the writer of this letter, who proved to be N. M Ward, Esq., of Padang, I speedily received the following more detailed communication, since which a box of prepared Sumatran coffee-leaves, kindly forwarded by him, has reached my hands:

"*Padang, 15th May*, 1853.

"Although long aware of its value as an article of diet among the natives here, it never occurred to me that it might be introduced successfully as such at home, until I learnt from the *Free Press* that a patent had been taken out by Dr. Gardner. It then struck me that as its adoption in Europe would unquestionably be attended with important advantages to the labouring classes, a knowledge of the fact of its general use here might be of service, by giving that confidence in it which must necessarily be wanting to a new and untried article. The fact of it being the only beverage of a whole population, and of it having from its nutritive qualities become an

(a) This employment of coffee-leaves was not previously unnoticed. Brande, in his *Manual of Chemistry* (Lond., 1818, vol. ii., p. 1616), briefly states that the leaves of the coffee-plant are used in Java and Sumatra as a substitute for tea, and that it is probable they contain *theine*.

important necessary of life, will be a sufficient guarantee of its safety as an article of diet, and of its freedom from deleterious effects.

"The natives have a prejudice against the use of water as a beverage, asserting that it does not quench thirst, or afford the strength and support the coffee-leaf does. With a little boiled rice and infusion of the coffee leaf, a man will support the labours of the field in rice-planting for days and weeks successively, up to the knees in mud, under a burning sun or drenching rains, which he could not do by the use of simple water, or by the aid of spirituous or fermented liquors. I have had opportunities of observing for twenty years the comparative use of the coffee-leaf in one class of natives, and of spirituous liquors in another, the native Sumatrans using the former, and the natives of British India settled here the latter; and I find that while the former expose themselves with impunity for any period to every degree of heat, cold, and wet, the latter can endure neither wet nor cold for even a short period, without danger to their health.

"Engaged myself in agriculture, and being in consequence much exposed to the weather, I was induced several years ago, from an occasional use of the coffee-leaf to adopt it as a daily beverage, and my constant practice has been to take a couple of cups of strong infusion with milk in the evening, as a restorative after the business of the day. I find from it immediate relief from hunger and fatigue, the bodily strength increased, and the mind left for the evening clear and in full possession of all its faculties. On its first use, and when the leaf has not been sufficiently roasted, it is said to produce *vigilance*, but I am inclined to think that where this is the case, it is rather by adding strength and activity to the mental faculties, than by inducing nervous excitement. I do not recollect this effect on myself except once, and that was when the leaf was insufficiently roasted.

. . . . .

"As a beverage, the natives universally prefer the leaf to the berry, giving as a reason that it contains more of the bitter principle and is more nutritious. They are not unacquainted with the extract in a half-solid form obtained by decoction, but in the lowlands I am not aware that they apply it to any particular purpose. The roasted leaf used to form an article of trade betwixt the coffee districts of the interior and the lowlands of the coast, but since the government monopolized the produce, this trade has in a great measure ceased, the natives believing the sale of the leaf as well as that of the berry, forbidden. In the lowlands, coffee is not planted for the berry, being not sufficiently productive; but the people plant about their houses for the leaf for their own use, not however to the extent of the demand, so that in the settlement of Padang they are obliged to have recourse to the berry mixed with a portion of burnt rice, without which the beverage would be too dear for them. It is an undoubted fact, however, that everywhere they prefer the leaf to the berry.

"The muster I have the pleasure to send, is the produce of my own ground, properly prepared by a native well acquainted with the process. The best mode of roasting, he says, is by holding the leaves over the clear flame of a fire made of dry bamboo. The fire-place should be circular, of brick or other material, two feet deep, two feet in diameter at the bottom inside, and one-and-a-half at top, with a small door-place on one side for introducing the fuel. The reason for using bamboo as fuel is, that it produces but little smoke, and that little containing no creosote, it does not adhere to the leaf. When sufficiently roasted, as described in the *Singapore Free Press*, the leaves have a brownish buff colour, and are then separated from the stalks, which are arranged in the slit of a stick afresh and roasted by themselves. The natives pound the whole of these roasted stalks in a mortar, and mix them with the leaf for sale; but as the bark only contains extract, it is better to rub off this betwixt the hands and to reject the wood.

. . . . .

"I have already remarked, that whilst the culture of the coffee-plant, for its fruit, is limited to particular soils and elevated climates, it may be grown for the leaf, wherever within the tropics the soil is sufficiently fertile. This extensive habitat, if I may so term it, added to its nutritive qualities and freedom from deleterious principles, points it out as the best adapted of all the productions affording caffeine for general consumption; and if it should turn out that the article can be sent to distant countries without deterioration, I shall have every confidence in its ultimate adoption for general use.

"The price here of the leaves prepared for use, is generally about 1½*d.* a pound; and, I suppose, it may be prepared and packed for the European market, of good quality, for 2*d.*, affording sufficient profit to the planter, and bringing it within reach of the poorest classes of Europe."

Such is Mr. Ward's communication. The sample which he sent has arrived in excellent condition, and appears to have been very carefully prepared. It consists of tolerably regular fragments of shining leaves mixed with pieces of stalk. Its colour is deep brown; its odour somewhat like that of a mixture of coffee and tea, and extremely fragrant. Immersed in boiling water, a transparent, brown infusion is obtained, which, when made sufficiently strong, forms, with the addition of sugar and milk, a beverage by no means unpalatable.

Caffeine, as is well known, is a crystallizable, nitrogenized, vegetable principle, (a) existing in the berries of the coffee-shrub, in the leaves of the tea-plant of China, in the *Yarba de Mate*, or Paraguay tea of South America, and, as MM. Berthemot and Dechastelus have proved, (b) in *Guarana*, the basis of a favourite beverage in some parts of Brazil. The plants affording these productions occupy very different positions in the vegetable kingdom; the coffee-plant belongs to the natural order *Rubiaceæ*, the tea-plant to *Camellieæ*, the Paraguay tea (*Ilex Paraguariensis*, St. Hil.) to the *Ilicineæ*, and the Guarana-plant (*Paullinia sorbilis*, Mart.) to *Sapindaceæ*.

It is not a little remarkable that Caffeine has hitherto been detected only in plants which are broadly distinguished from each other in their botanical characters; but it is yet more extraordinary that these plants should have been *independently* selected as articles of diet by semi-barbarous nations, inhabiting widely-separated portions of the globe.

(a) Its composition is expressed by the formula $C8\ H5\ N2\ O2$. *Theine* and *Guaranine* are identical with *Caffeine*.
(b) *Journ de Pharm.* (Aug. 1840), tome xxvi., p. 518.

Home Correspondence.

CONSUMPTION OF SMOKE.

SIR,—Mr. G. F. Wilson has given a very clear description of his experiences in smoke consuming. The principle is that of making the heat of the red fire distil and coke the raw fuel which is added in small quantities, and burning the gases as they pass over the red fuel.

This is precisely the principle adopted thirty years ago by Cutler, in what he called his Gas Stove, *i.e.*, the fire was made in the top of the oval and burned downwards, so that the smoke and gas as generated had to pass through the fire and were consumed.

But Cutler's Gas Stove went out of use—because it was a piece of mechanism requiring a little attention.

Now, although it is true that manufacturers may be able to make arrangements for consuming their smoke under penalty of the law and prosecution, yet, when all the manufactories and steam boats—under close watching of the police, have done this, it will not make the atmos-

phere of London clear, for the simple reason that dwelling houses, and not manufactories, produce the great mass of the smoke; and how would dwelling-houses be watched by policemen and provided with smoke consumers? What smoke-ometer shall be applied as the test to take it out of the category of mere opinion opposed by opinion in evidence before a magistrate. And unless we can get rid of house smoke we shall not accomplish our object by merely ameliorating the factories.

We must dig a little deeper to begin at the beginning. Fuel is of various kinds—smokeless and smokeful. To produce perfect combustion a certain admixture of certain gases is requisite. With an imperfect mixture of smoke, an imperfect combustion is the result, nor does it follow that the combustion is perfect even when smokeless, for noxious gases may pass off invisibly.

It is possible by chemical analysis to determine the degrees of perfection in the various kinds of fuel brought to market—as, for instance, what degree of encumbering gases they contain which may produce smoke or noxious exhalation. They might be ranged in lists, from the pure white-flamed Cannel coal down to coke.

As smoke and impure gases are a nuisance, the simplest process would be, instead of requiring smoke consuming, and disputing on what is smoke and what is not, to require of those making smoke to pay a tax on their fuel proportioned to the damaging power. Thus certain qualities of coal and coke would pass without duty, and certain others would pay a minimum duty, and certain others a maximum duty. If this duty were so regulated that the low-priced coals became practically dearer than the more perfect fuel, the latter would be preferred and the former discontinued, till the proprietors might contrive to produce it in an unobjectionable form by some process of manufacture. The appointment of officers at the different points by which fuel is brought to London, to collect the duties, would be an inexpensive and effective process, making it imperative, in the interest of the general community, to abstain not merely from smoke, but from noxious gases.

Perhaps some of your chemical readers might furnish a statement of the composition of the various kinds of fuel brought to London, pointing out the best and the worst, and set up a competition amongst fuel owners to produce the most perfect fuel, with a duty on the imperfect, and the smoke nuisance will be at an end.

I am Sir, yours faithfully,

W. BRIDGES ADAMS.

Nov. 14, 1853.

PERFUMERY AND CHEMISTRY.

Sir,—If the author of the letter on Chemistry and Perfumery, published in No. 50 of your Journal, and intended as a reply to mine—though none was needed—which appeared in No. 49, really be a perfumer, as his signature implies, he would know that I could not, though ever so inclined, "confine the term Perfumery" to various odoriferous substances, and exclude scented soaps; because he would be aware that one-third of the returns of every manufacturing perfumer is derived from perfumed soap.

I do, however, emphatically exclude from the term perfumery, "groceries, &c.," the *et cætera* meaning, I presume, "confectionery," because perfumery has to do with one of the senses—smelling, while groceries, &c., are distinguishable by another—taste; and, had not our physical faculties clearly made the distinction, commerce and manufactures would have defined them.

I therefore repeat, that essences of fruits are not used in perfumery, as stated in No. 47, from the quoted authorities. If any man can deny this assertion, let him now do so, "or for ever after hold his peace," at least upon this subject.

The Journal of the Society of Arts is not a medium of mere controversy. If a statement be made in error, let truth correct it; which, if gainsayed, it should be done—not under the veil of an anonymous correspondent, but with a name to support the assertion.

Science has to deal with tangible facts and figures; to the political arena alone belongs the anonymous ink-spiller.

I am, Sir, yours faithfully,

SEPTIMUS PIESSE.

42, Chapel-street, Edgeware-road.

RUSSIAN LEATHER.

Sir,—From statistical tables, we find that leather forms an important article of export from this country. In order to retain this trade it is necessary not only to produce a good article, but such as is not likely to be surpassed. The leather manufactured in Russia has long been celebrated for its durability (I believe the peculiar smell is produced by the oil of birch bark). Can any of your correspondents, from actual observation, give any account of the mode of preparing Russian leather "from the hide?" If found suitable, the process might, I believe, be introduced into this country with advantage.

G. N. H.

Proceedings of Institutions.

Lancaster.—A lecture was lately delivered to the members of the Church of England Instruction Society by Mr. Johnson, of Bishop Stortford. The subject was "The Recent Discoveries at Nineveh and Babylon." The judicious selections which he made, as well as the manner in which he treated the subject in general, elicited great approbation from a numerous and attentive audience. His references to Scripture and to various ancient authors were highly interesting and instructive, while the numerous and ably executed diagrams which he exhibited materially increased the gratification which the lecture afforded.

Newbury.—On Tuesday evening Mr. J. T. Topham delivered an interesting lecture "On the History and Utility of Poetry," to a highly-respectable and numerous audience, at the Literary and Scientific Institution. The lecturer, at the outset, drew attention to the extreme antiquity of poetry, and traced its origin to religious feeling. He then presented us with some poetic fragments from the Old Testament, introducing the Thanksgiving Ode of Moses, as the oldest complete poem on record. He referred to the universal cultivation of poetry, and reminded us of a time when traditionary poems were the only existing histories, and when even laws were metrical compositions. He glanced at the great poetic writers of Greece; of classic and modern Italy; of France from its early minstrelsy to the present more polished period; and said a word or two on the romancists of Spain, and the celebrities of Germany. He then entered on the history of our own poetry. After the conquest the native minstrels were of course neglected by the Norman rulers; and it was not until a century or two after that great epoch, that the Normans and Saxons "fraternized," and the English language became formed. The first work in this new language contained the achievements of King Arthur. Soon afterwards there appeared a Life of Charlemagne; and from these two volumes may be traced almost everything that was written or sung about this period. The Crusades soon after took place, and these introduced to us a different kind of fiction. The Holy Land was the scene of the new stories, and dragons, and dwarfs, and giants, were then "things expected" in our romances. Robert Langlande wrote the first original poem in the English language, and Chaucer, a contemporary of his, made a great advance on all preceding poetry. The lecturer then referred to the invention of printing, and the mighty changes it had effected. He traced the causes which led to the revival of classic learning, and dilated on the colossal effects occasioned

by this and the printing-presses of Caxton. Then Spenser delighted by his sweet imagery; and that mighty bard appeared who wrote "not for an age but for all time," of whom the lecturer said, quoting the language which Shakspeare puts into the mouth of Antony, "he makes hungry where most he satisfies." The lecturer also referred to the poets of the 17th century, passing a glowing eulogy on Milton, and specially commending Pope's "gems of wisdom." The peculiarities of subsequent poets were adverted to, and Burns and Cowper, and Crabbe, and Moore, were passed in review. Scott's marvellous powers of dealing with the legendary and the chivalrous were enforced, and Byron's magical genius received due recognition. The lake poets were reviewed; Wordsworth receiving special reference and homage. The poets, male and female, of the present day, were glanced at; the lecturer leaning to the notion that the female poets have the supremacy in inspiration. The concluding portion of the lecture was an elaborate vindication of poetry from the attacks of its detractors. There are some who detest "ballad-mongers;" who regard them as merely frivolous and useless writers. If they are correct in their opinion, the lecturer said, the Homers, and Virgils, and Wordsworths, and Cowpers, and Miltons, and Shakspeares lived in vain; and the man who could seriously assert this would display not his wisdom, but his eccentricity and temerity. He dwelt on the good that results from emotional appeals, and from the merely beautiful. He showed the poetical in nature around us, insisted upon its utility, and with considerable warmth and energy compared and contrasted natural with artistic beauty. Poetry, he believed, meets a requirement in the nature of man; and will last as long as man has spiritual thoughts, as long as he is influenced by hope and love, as long as he owns bright anticipations, as long as he is surrounded by suggestive solemnities, and as long as he is the participator of "the mystery" of existence.

Sevenoaks.—On Thursday, November 10th, a lecture was delivered by Dr. Vesalius Pettigrew, at the Literary and Scientific Institution, on "The Advantages of the Lower Animals to Man." To illustrate this lecture those animals were chosen whose province it is to clear away all decayed animal and vegetable matter—"scavengers," as the Doctor humourously called them—the worm, the beetle, the fly (blue-bottle), the star-fish, the adjutant, the hyena, &c., &c. This is the third lecture the Doctor has given to this Institution, all of which have been numerously and respectably attended. The Marquis of Camden has taken the chair on each occasion.

Shrewsbury.—On Tuesday, November 8, Mr. Elsmere delivered his first lecture on Botany and Vegetable Physiology, to the members of the Shropshire Mechanics Institution. The subjects of the lecture were—The Nature and Uses of Botany; the Germination of the Seed; the Root, and its various Uses; the Stem, its Functions and Anatomy. In conclusion, the lecturer remarked that the vegetable world afforded us satisfactory proof of the existence and goodness of God, and furnished unanswerable arguments to atheistical sophistries. At the close of the lecture a vote of thanks was proposed by the president, and carried by acclamation.

St. Leonard's-on-Sea.—The annual soirée of the Mechanics' Institution was held on Tuesday week in the Assembly Rooms, and was very numerously attended. The president of the Institution, Mr. Alfred Burton, occupied the chair, and was supported by many of the leading residents of the place. Mr. S. Putland, jun., read the report, from which it appeared that the number of subscribing members was 184, having been 170 at the corresponding period last year. In addition to these there were ten life members. The library consists of about 850 vols. The reading-room is supplied with three daily and three weekly newspapers, and five weekly and one monthly periodicals. The Local Exhibition, held in the same rooms in January and February last, was visited by upwards of 4000 persons, and the receipts netted £80, which sum was carried to the credit of a fund for a new building, which the Institution hoped to be able to erect on a scale commensurate with the rising prosperity of the town. Valuable results are looked forward to from the union with the Society of Arts. The president then addressed the meeting, and was followed by the president of the Hastings Mechanics' Institution (George Scrivens, Esq.), the Rev. W. W. Hume, Mr. Selway, Mr. Banks, Mr. Ward; and by Mr. Tufnell, the Government Inspector of Schools, who was a visitor on the occasion. A vote of thanks to the chairman was proposed by Sir Woodbine Parish, K.C.H., and seconded by P. O'Callaghan, &c.

Warminster.—The first lecture of the season at the Athenæum, was delivered on Tuesday, the 4th Oct., by Mr. Ansell, on the "Electric Telegraph." The lecturer did not confine himself to the mere exhibition of an instrument, and of those aerial highways of words—those mysterious threads—which we see at railway stations and along the lines of our *chemins de fer*—our iron roads. He went back far into antiquity, to give, historically, an account of all the successive modes of signals which nations have adopted; commencing with the Siege of Troy, and ending with the era of railroads—embracing beacon fires, semaphores, and all the various modes of telegraphic communication under whatever mode of operation they might have been in use—showing their greater or lesser value in simplicity and intelligence—their sufficiency or insufficiency through gloom and fogs, by land and sea. The lecturer brought a staff of operators, who communicated messages from the lecture-desk to the gallery. The lecture was highly appreciated.—On Monday the 16th, Mr. Bird lectured on "Asteroids, and luminous and shooting stars." The lecturer discussed the theories of the most eminent astronomers who have written upon that branch of astronomical science of which his lecture treated. The theory of Obers, in particular, as to a lost world was noticed, and its probabilities presumed.

Whitchurch.—On Tuesday evening last, a lecture "On the Life and Writings of Cowper," was delivered to the members of the Mechanics Institute, in their reading-room in the Town Hall, by the Ven. Archdeacon Allen, vicar of Prees. The Rev. W. H. Egerton, President of the Institute, introduced the rev. lecturer to the audience, and at the close of the lecture proposed, on behalf of the officers and members of the institute a vote of thanks, which was most warmly responded to.

To Correspondents.

NOTICE.—The Council desire to call the attention of the Members and others to the increase which has been made in the size of the Journal, by the addition of four pages of matter. This addition will be given every week during the session, when the papers read at any of the ordinary meetings run to such a length as would preclude, under other circumstances, the publication of shorter articles and letters of general interest on the subjects embraced within the Society's operations. The Council trust to receive the cordial support of the general body, to enable them to carry out, with increased and increasing interest, this feature.

MEETINGS FOR THE ENSUING WEEK.

Mon.	Chemical, 8.
	Statistical, 8.
	Geographical, 8½.
Tues.	Civil Engineers, 8.
	Medical and Chirurgical, 8½.
	Zoological, 9.
Wed.	Society of Arts, 8.—Mr. G. F. W. Stansbury, "On Machines for Pulverizing and Reducing Metalliferous Ores."
	Arch. Assoc., 8½.
	Royal Society of Literature, 8½

THURS. Royal, 8½.
FRI. Philological, 8.
Architectural Assoc., 8.—Class of Design.
SAT. Botanic, 3¾.
Medical, 8.

Miscellanea.

CAPT. PEACOCK'S PATENT BELL BUOYS.—Three of these buoys are now in the Southampton dock, which the Mexican government have ordered for a part of the coast in the Gulf of Mexico. They are enormous buoys, with large bells, and their use is in thick and foggy weather, when the buoys cannot be seen. The surging of the waves causes the bells to ring, which gives information of the locality of the buoys. The apparatus is such also as to answer the purpose of life buoys, where several persons can be sheltered until they are rescued. The Russian government recently ordered one of the patentee for Riga. One is placed off Calshot Castle, near the entrance of the Southampton Water, and it has been proposed to place one near the entrance of the Solent, which would afford great assistance to the pilots and commanders of the Southampton mail packets. Colonel Facio visited Southampton on Monday, to inspect the buoys for the Mexican government. Captain Peacock has recently submitted models of his very useful invention to the Admiralty and Trinity Board.

COMMUNICATION BETWEEN THE GUARD AND DRIVER OF A RAILWAY TRAIN.—Captain Norton proposes that a Whistling Bolt or Arrow, without feathers, should be shot from a steel cross-bow by the guard of the train, a few yards in a direct line over the head of the engine driver, who should have a shield or a screen behind, reaching a foot above his head. The guard could place the bow on the roof of the carriage in his front—in a position marked out, so that every shot would follow the same tract, without the necessity of raising the bow to his shoulder or taking any aim. Captain Norton has also invented a new Fog-signal. This apparatus consists of a small piece of seasoned wood, such as ash or elm, which has a chamber drilled into it, to receive about three drachms of Hall's rifle-powder: this hole is stopped with a wooden plug, glued in. A small touch-hole on the side receives a quill, charged like that for firing a cannon by percussion, but more simple in its construction—being without the transverse quill. The fault of the fog-signal at present in use is, that the tin case containing the charge of percussion powder, is crushed by the wheel of the engine: the percussion powder is in consequence not confined when the explosion takes place.

CONSOLIDATED SODA WATER.—A curiosity in saline drinks—termed by the inventor, M. Lamplough, "consolidated soda water"—has just made its appearance. Aerated, or gassed, water is common enough, but not so real soda water. M. Lamplough, however, now gives us the true article, in the very portable condition of a ready prepared powder, from which we can always obtain an "effervescing pyretic saline" draught of unvarying quality. A small bottle, with a cork-fitted stopper, holds twenty-four such draughts, in the shape of a powder, a teaspoonful of which, mingled in a glass of water, disengages a greater amount of carbonic acid gas than is producible by any ordinary means. The powder is, indeed, carbonic acid gas solidified, a substance being added for the perfect preservation of the gas. So convenient a means of obtaining a cool effervescing fluid carries its own recommendation with it.

OYSTER FISHING IN THE BAY OF LUCE.—Two years ago a discovery was made of extensive oyster beds in the Bay of Luce. The oysters proved to be of a large and superior quality—one of them being equal to three of the Lochryan oysters. The constant annual dredging of the Lochryan beds necessarily deteriorated the size and quality of the oysters; and the large rent payable to the proprietor make the fishings not a very profitable business for those engaged in it. The discovery in the bay of Luce was, therefore, looked on with much satisfaction by the fishermen and the public; but it was no sooner made, than it brought forward Patrick Maitland, Esq., of Freugh, to claim an exclusive right to the whole oysters in the bay, and in the seas below the bay—rather an extensive boundary, which might include the bay, properly so called, from the foot of the River Luce to the Mull of Galloway and the Burghhead, and also the Solway Frith and the Irish Channel to the Isle of Man. He founded on a Crown charter and sasine, and issued printed notices, intimating his alleged right, offering to grant licenses—and threatening legal proceedings against those who should disregard it. Mr. John M'Clelland, fisherman, Tyrawley, parish of Kirkmaiden, had been a successful oyster dredger, and having exercised his calling hitherto without interruption, was not inclined to abandon it without trying the question with Mr. Maitland. An application for interdict and damages, at Mr. Maitland's instance, was the consequence. The case has been in dependence for some time, and has now been finally decided in favour of Mr. M'Clelland, by an interlocutor and note of Sheriff Urquhart.—*North British Daily Mail.*

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

From Gazette, 11th November, 1853.

Dated 5th August, 1853.

1831. W. Smith and T. Phillips, Snow hill—Improvements in gas stoves.

Dated 17th August, 1853.

1926. T. Grimsley, Oxford—Machinery for manufacture of bricks, tiles, &c.

Dated 12th October, 1853.

2350. C. S. Jackson, Cannon street—Preserving timber and other vegetable matters.

Dated 25th October, 1853.

2455. T. Summerfield, Birmingham—Construction and manufacture of windows.
2457. J. B. Verdun, Paris, and 4, South street, Finsbury—Construction of globes.
2459. J. D. Brady, Cambridge terrace, Hyde park—Appendage to knapsacks.
2461. J. Beasley, jun., Smathwick, Staffordshire—Construction of puddling furnaces applicable to generation of steam.
2463. A. V. Newton, 66 Chancery lane—Printing press. (A communication.)
2465. W. Bottomley, North Brierly, Bradford, Yorkshire—Improved machinery for weaving by jacquard loom and otherwise.
2467. W. Grimshaw, Mossley, Antrim—Steam boilers.

Dated 26th October, 1853.

2469. E. Austin, Pembroke cottages, Caledonian road—Surveying and raising sunken vessels, &c.
2471. R. Heyworth, Cross hall, Chorley, Lancashire—Looms for weaving.
2473. E. J. Hughes, Manchester—Sewing or stitching apparatus.
2475. D. Edwards, Ravenscliffe, Douglas, Isle of Man—Railway signal apparatus.
2477. F. L. H. Danchale, Elm grove villas, Acton green, and W. Startin, Heathfield terrace, Turnham green—Obtaining and applying motive power.
2479. B. Joly, Gaillon, France—Improvements in dyeing.
2481. J. T. G. Vitzetelly, Peterborough court—Plates for printing purposes, &c. (Partly a communication.)

Dated 27th October, 1853.

2482. A. F. Rémond, Birmingham—Manufacture of metallic vessels.
2483. T. S. Blackwell, Cranbrook, Kent—Signalizing and stopping railway trains.
2484. R. Richards, Paddington—Apparatus indicating water in holds of ships.
2485. T. Dawson, King's Arms yard—Cover for umbrellas which can be worn as a garment.
2487. W. Vaughan, Stockport, Cheshire, J. Scattergood, Heaton Norris, Lancashire, and C. Grimshaw, Brinnington, Cheshire—Improvements in harness for weaving, and apparatus for making same.
2488. R. Bishop, Edinburgh—Steam and water valves.
2489. H. Dolby, 56 Regent street—Embossing presses.
2491. J. M. A. B. Limonier, 103, Quai St. Leonard, Liege—New system of weaving by hand.
2492. E. Loysel, 2 Rue de Gretry, Paris—Improved coffee pot.
2493. J. Gurney, St. James's street—Treatment of waterproof fabrics.
2494. R. A. Brooman, 166, Fleet street—Manufacture of coloured and ornamented fabrics. (A communication.)

Dated 28th November, 1853.

2495. M. Maclaren, Johnston, Renfrew—Fireplaces, grates, &c.
2496. A. M. Sewan, 8, Philpot lane—Treatment of Phormium tenex, &c.
2497. J. Johnson, Over Darwen, Lancashire—Looms for terry weaving.
2498. J. W. Wilkins, Ludgate hill—Obtaining power by electro-magnetism.

Dated 29th November, 1853.

2500. J. Nasmyth, Patricroft—Pistons and rods of steam hammers, &c.
2501. E. D. Smith, 7, Hertford street, May-fair—Railway carriages to prevent collision, &c.
2502. P. O. Bernard, Rood lane—Hamper for wine, &c., in bottles.
2503. R. A. Brooman, 166, Fleet street—Machinery for dressing flax, &c. (A communication.)
2504. G. J. Gladstone, 10, Brunswick terrace, Blackwall—Ascertaining and indicating depth of water in holds of ships.
2505. A. Maclure, Walbrook—Lithographic printing presses.
2506. W. Betts, 1, Wharf road, City road—Machinery for manufacturing metallic capsules.

Dated 31st November, 1853.

2507. J. T. Wright and E. P. Wright, and W. Ashbury, Birmingham—Improvements in mill banding.

2508. J. Haley, Manchester—Machinery for cutting, boring, &c., metals, &c.
2509. E. G. Banner, Cranham hall, Essex—Motive power.
2510. C. Goethel, and C. M. Zimmerman, Philadelphia—Stereoscopes.
2511. F. P. Rovère, 4, Wellington street, Strand—Joints for tubular drains.
2512. P. M. Parsons, Duke street, Adelphi—Switches.
2513. J. Gray, M.D., Dublin—Self-acting flushing apparatus.
2514. G. Hamilton, Paisley, Renfrewshire—Spreading starch, gum, &c.
2515. A. P. Conbrough, Blanefield, Stirlingshire—Printing textile fabrics, &c.
2516. J. Brown, Darlington—Waggons.
2517. D. Assanti, Upper Berkeley street—Improved cooling or freezing mixture.
2518. R. Restell, Croydon—Warming conservatories, &c.
2519. C. Pechoin and E. P. Barades, La Chapelle, St. Denis, France—Utilizing saponaceous waste matters.

Dated 1st November, 1853.

2522. S. Lomas, Manchester—Machinery for spinning and doubling silk.
1524. M. Newton, Tottenham—Carriages, and preventing them from overturning. (A communication.)
2526. J. & T. Whitehead, Leeds—Cutting tools and working iron, brass, &c.
2528. J. Chesterman, Sheffield—Hardening and tempering steel, and grinding, glazing, &c., steel, &c.
2530. Captain J. Bauer, Vienna—Steam-digging and harrowing machine.

Dated 2nd November, 1853.

2534. W. Taylor, Newport Pagnel—Stopping bottles of aerated liquids.
2536. E. D. Smith, 7, Hertford street, May-fair—New buffer-break.
2538. E. Ward, Potton, Bedfordshire—Carriage axles. (A communication.)
2540. B. Willis and J. Musto, East London Iron Works, Mile End—Rotatory pumps.
2544. J. Howard, Bradford—Horse rakes and harrows.
2546. C. Iles, Pulworks, Birmingham—Metal bedsteads.

WEEKLY LIST OF PATENTS SEALED.

Sealed 9th November, 1853.

1143. John Clapham, Thomas Clapham, and William Clapham, of Wellington foundary, Keighley—Improvements in moulding and casting iron pipes.
1153. George Stevenson Buchanan, of Glasgow—Improvements in the treatment or finishing of textile fabrics.
1172. George Frederick Goble, of Fish street hill—Improvements in propelling vessels and carriages; parts of the machinery therein employed being also applicable to other like purposes.
1234. Benjamin Newton, of Brighton—Improvements in the manufacture of mats.
1314. George Harriott, of Islingham, Frindsbury, Kent—Improvements in agricultural implements employed in crushing and rolling land, and in frames for the same.
1336. George Goodlet, of Leith—Improvements in engines to be worked by steam, air, or water combined.
1348. William Knowles, of Bolton le Moors—Improvements in machinery for warping and beaming yarns or threads.
1377. Henry John Beljemann, of New Oxford street—Improvements in chairs.
1427. William Henry Smith, of Bloomsbury—Improvements in the permanent way of railway.
1481. John Piddington, of Brussels—Improvements in obtaining infusions and decoctions, and in vessels or apparatus employed therein. (A communication.)
1673. Richard Archibald Brooman, of Fleet street—Improvements in the manufacture of anvils.
1681. George Gowland, of Liverpool—Improvements in certain nautical and surveying instruments.
1742. Joseph Bennett Howell, of Sheffield, and William Jamieson, of Ashton-under-Lyne—Improvements in the manufacture of saws.
1774. Griffith Jarrett, of London—Improvements in machinery or apparatus for stamping and printing coloured surfaces.
1892. Daniel Illel Picciotto, of Crosby square—Improvements in weaving. (A communication.)
1925. Thomas Kirkwood, of Edinburgh—Improvements applicable to ventilation and other purposes.
2028. John Hinks, George Wells, and Frederick Dowler, all of Birmingham—Improved machinery to be used in the manufacture of metallic pens and pen-holders.
2059. William Joseph Smith, of Stretford—Improvements in buttons or other such fastenings, and in applying or fixing them to wearing apparel.
2081. Cyprien Marie Tessié du Motay, and Edmond Louis Duflos, of Paris—Improvements in the mode of bleaching fibrous and other substances.
2083. James Childs, of Gilston road, Brompton—Improvements in the manufacture of materials to render them suitable as substitutes for mill-board and such like uses.
2085. Ernest Alexander Gouin, of Avenue de Clichy, Paris—Improvements in looms or weaving machines applicable to the weaving of cotton, silk, flax, hemp, wool, or any other fibrous substances.
2097. Robert Trouson, of the Chamber of Commerce, Liverpool—Improvements in ventilating and preventing spontaneous combustion in ships and other vessels laden with coal, culm, or cinders.
2098. Thomas Metcalfe, of High street, Camden town—Improvements in portable chairs and tables.
2100. John Ward, of Saville House, Leicester square, and Edward Cawley, of Stanley street, Chelsea—Improvement in chairs, couches, and tables.
2101. Joseph Marks and John Howarth, of Massachusetts—Improvements in machinery or apparatus for operating the brakes of a train of railway carriages.
2108. Joseph Maudslay, of Lambeth—Improvements in boilers and furnaces for generating steam.
2120. Jacob Behrens, of Bradford, Yorkshire—Improvements in the manufacture of zinc. (A communication.)
2122. Emerson Goddard, of New York—Improvements in machinery for cutting stone.
2123. Moses Poole, Avenue road, Regent's park—Improvements in apparatus and means for removing matters or heat from currents of air, gases, or vapours from liquids, and for communicating matters or heat to the same. (A communication.)
2134. Richard Dugdale Kay, of Bank terrace, Accrington—Improvements in block printing.
2135. Moses Poole, of Avenue road, Regent's park—Improvements in machinery for separating flour, shorts, and dustings from bran, as it comes from the bolting apparatus. (A communication.)
2137. Jacob Behrens, of Bradford, Yorkshire—Improvements in generating steam in steam boilers. (A communication.)
2148. Moses Poole, of Avenue road, Regent's park—Improvements in distributing printers' type. (A communication.)
2180. Moses Poole, of Avenue road, Regent's park—Improvements in life preservers. (A communication.)
2185. Joseph Gibbs, of Abingdon street—Improvements in the treatment of minerals, for the purpose of separating impurities therefrom.

Sealed 11th November, 1853.

1167. Edmund Whitaker, of Rochdale, and James Walmesley, the younger, of Smithy Bridge, near Rochdale—Improvements in the manufacture of pipes, tiles, bricks, and slabs, from clay.
1169. George Bell, of Powell street, Goswell street—Improvements in obtaining liquid cement and pigments or paints.
1200. Stephen Garrett, of Taunton place, Bermondsey—Improvements in the preparing and tanning of skins, hides, or felts of animals.
1371. William Edward Maude, of Liverpool—Improved apparatus for steering ships. (A communication.)
1617. William Edward Newton, of Chancery lane.—Improvements in locks and latches. (A communication.)
1789. John Carvalho de Medeiro, of Passy, near Paris—Improvements in the means or processes for preserving metals from corrosion. (A communication.)
2047. Thomas Bollman Upfill, and William Brown, both of Birmingham—Improvements applicable to metallic bedsteads, couches, chairs, and such other articles as are or may be used for sitting, lying, and reclining upon.

Sealed 12th November, 1853.

1177. Julian Bernard, of Guildford street, Russell square, and Edward Taylor Bellhouse, of the Eagle Foundry, Manchester—Improvements in pressing and in extracting fluids.
1188. John Knowles, of Manchester, and Edward Taylor Bellhouse, of the same place—Improvements in the manufacture of articles of marble.

Sealed 14th November, 1853.

1197. William John Warner, of King street, Soho—Improvements in dry gas metres.
1201. Peter Arnaud Le Comte de Fontaine Moreau, of South street, Finsbury—Improvements in steam engines. (A communication.)
1202. Peter Arnaud Le Comte de Fontaine Moreau, of South street, Finsbury—Improvements in steam boilers. (A communication.)
1209. Robert Boyd, of Paisley—Improvements in weaving.
1220. Charles Cowper, of Southampton buildings—Improvements in machinery for combing and preparing wool and other fibrous substances. (A communication.)
1243. John Thornbarrow Manifold, Charles Spencer Lowndes, and John Jordan, all of Liverpool—Improvements in the method of extracting the juice from the sugar cane.
1263. Samuel Alfred Carpenter, of Birmingham—Improved elastic webbing or fabric.
1309. William Wolfe Bonney, of West Brompton—Improvements in machinery for raising a pile or flue by abrasion, on linen, cotton, silk, and other fabrics.
1329. Julian Bernard, of Guildford street, Russell square—Improvements in obtaining differential mechanical movements.
1370. William Edward Maude, of Liverpool—Improvements in carriages. (A communication.)
1541. John Henry Johnson, of Lincoln's inn fields—Improvements in the production or manufacture of flour. (A communication.)
1615. Robert Anderson Rust, of Regent street—Improvements in pianofortes.
2002. Peter Arnaud Le Comte de Fontaine Moreau, of Finsbury—Improvements in apparatus for heating. (A communication).

Journal of the Society of Arts.

FRIDAY, NOVEMBER 25, 1853.

SECOND ORDINARY MEETING.

WEDNESDAY, NOVEMBER 23, 1853.

THE Second Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 23rd instant, THOMAS HOBLYN, Esq., F.R.S., in the Chair.

The following Candidates were balloted for and duly elected :—

William Henry Absolon; Rev. Henry Baber, M.A.; Henry Blundell; John Calvert; John Moxon Clabon; Robert Dawbarn; Samuel Holme; W. S. Northhouse; John Henry Pepper; Osman Ricardo, M.P.; R. A. Slaney; George Spottiswoode; William Staniland; and Lord Wharncliffe.

The paper read was—

ON MACHINES FOR REDUCING AND PULVERIZING METALLIFEROUS ORES.

BY CHARLES F. STANSBURY.

Before proceeding to discuss the more prominent means now in use, for extracting the noble metal from the substances with which it is found associated, it will be well (very briefly) to consider the conditions in which gold presents itself in the various localities where it is found.

It has often been remarked, as an evidence of he wise care of Providence, that while gold, which possessed a comparatively artificial value, existed but in small quantities and in few localities, iron, the most useful of metals, was distributed in vast quantities in every quarter of the globe, and was everywhere accessible to man. The present appearance of things would seem to throw some doubt over the truth of this remark, which would appear to be more pious than just. The fact is that gold is found in every quarter of the world, and every day's research opens new fields to the enterprise of the gold-seeker. The authority of a year on this subject is already out of date. California, whose gold fields were opened only six years ago, had hardly successfully asserted its claim to the title of the Eldorado, before she found a powerful rival in your own Australia; and even this seems destined to share attractions with Devonshire and Wales.

The most ancient source of the precious metal mentioned in the sacred writings, is "the land of Havilah, where there is gold," and of which it is said "the gold of that land is good." Of Ophir, we are told that "they fetched from thence gold and brought it to Solomon," and that "Jehosophat made ships to go to Ophir for gold;" but we know not with certainty the situation of Ophir; nor have we the means of ascertaining in what form the metal presented itself, or whether the diggers of those ancient days reduced it by means of crushers, cradles, or long-toms.

In later times, Africa was long a noted source of gold, which gave a name, indeed, to a large portion of its coast. The metal was found in small particles, known in commerce as "gold dust," collected, no doubt, by some rude process of washing, from the sands in the beds of the intermittent streams. The region on the south of the Sahara, as also Sofala and Kordofan, were prolific sources of the precious metal. Sofala has, indeed, by some been supposed to be the ancient Ophir, and was long the chief emporium of the gold brought from the interior. But Africa is now entirely eclipsed by our modern Eldorados. It is said to yield about 5,000 lbs. weight annually.

Asia has long been, and still continues to be, an important source of gold; indeed it was brought from the Indian Islands in remote times, and more recently gold deposits have been extensively worked in the Siberian and Ural districts. In the Ural it is found in small pieces, embedded in coarse gravel, and in veins of quartz in hard rocks. It is sometimes found associated with platinum.

America, too, has made her full contribution to the stock of the noble metal. Brazil, Chili, Peru, Ecuador, New Granada, have all yielded rich supplies. The streams which run from the mountains bring down their precious freight in their pebbly beds. These were for a long time the chief sources of Brazilian gold, but it is also found in veins in the rocks, which modern capital is making available and profitable. The quantity yielded in Mexico is comparatively small, and it is always found there associated with silver. The Apalachian chain of the United States sends downs in some of its streams quantities of auriferous deposits, which have been worked with advantage in Virginia, the Carolinas, and Georgia.

But all the gold fields of America sink into comparative insignificance before the immense yield of the single state of California; which, in six years, has transformed a wilderness into a populous and wealthy state, with agriculture, arts, and commerce. The gold discovery here took the usual course. It originated in accident, got wind against the will of the first discoverers, was kept alive by rich findings in alluvial deposits, and at last subsided into something like a regular branch of industry, into which more perfect methods were introduced, as the eagerly sought wealth began to demand for its attainment a more steady and laborious industry. Rich sands and nuggets gave place to quartz ore, which required to be mined with great labour—crushed by heavy machinery, and amalgamated by careful and expensive processes.

In Europe, gold is found in many localities; the principal of which are Hungary and Transyl-

vania. But England and Wales seem, from recent events, to bid fair to take their place among the most important gold-producing countries of the world. The precious metal occurs here in a state of minute division in quartz rock. In Devonshire the red and brown gossans contain a per centage which will amply repay the cost of reduction, by the best methods now known. The following statement of the results of eight recent experiments with some auriferous quartz from Merionethshire, Wales, will show the grounds of the opinion above expressed:

	lbs.		grs.		Oz.	dwts.	grs.
Oct. 20.—	362	yielded	154	at the rate per ton	1	19	17
,,	98	,,	66	,,	3	2	20
25.—	320	,,	138	,,	2	0	6
,,	75	,,	31	,,	1	18	14
Nov. 7.—	166	,,	72	,,	1	18	0
,,	196	,,	222	,,	5	5	17
11	748 (lead)		294	,,	1	16	18
,,	748 (pyrites)		173	,,	1	1	15

The Britannia gossan from Devonshire yielded, by recent experiments:—

1st expt.	½ a ton	produced 7 dwts	14 dwts. the ton.
2d. ,,	1 ton	,,	1 oz. and 20 grs.

A specimen of Cornish ore yielded at the rate of 11 oz. 13 dwts. and 8 grains to the ton. The Poltimore gossan has yielded from 17 to 32 dwts. to the ton, and other Devonshire ore 9 ounces to the ton. These results have been obtained within the last month, and go to show that the long-cherished dream of finding gold in profitable quantities in England is about to be realized. The experiments just mentioned have all been made at an expense not exceeding 5s. the ton for the reduction. The same ores have been smelted at a cost of 30s. per ton.

A word on the subject of England's great gold producing colony, will conclude these hasty preliminary observations.

Australia has only been known as a gold-producing country since 1851; for although shepherds and others were known to have picked up stray pieces of gold-bearing quartz for some years previously, it was not suspected to exist in quantities sufficient to repay the labour of collection, until Mr. Hargreaves, a practical miner, who had gained his experience in the Californian gold-fields, showed that the metal could be obtained in large quantities on the western slopes of the Blue Mountain Range. Subsequent researches have proved the metal to exist in larger or smaller quantities throughout the settled districts of South-Eastern Australia; and, from the character of the ranges to the north of New South Wales, it is suspected that they will prove equally prolific. Hitherto the metal has been obtained solely by the simple process of washing; for, although machinery has been introduced by public companies for the purpose of extracting it from the quartz rock, no important results have yet been attained. Indeed, in the first instance, the metal appears to have been sought for only in the alluvium, until the discovery of a monster nugget, consisting of nearly a hundred weight of gold, in a quartz-ridge near Bathurst, called attention to the parent rock; and the subsequent researches of the Government geologists brought to light veins of auriferous quartz so extensively diffused, that quartz mining must soon become one of the chief industrial employments of South-Eastern Australia.

Notwithstanding this extensive distribution of gold, and the great desire of man to become possessed of it, the methods which human invention has hitherto devised for the purpose of obtaining it, have been but partially successful. There is abundant evidence to show that, up to the present time, no method that has been applied has succeeded in extracting all the precious metal from auriferous ores. A friend of my own, who has travelled extensively in Russia, states that a very large proportion of the wealth of the Russian ores is lost—by confession of the mining men themselves—in the process of reduction now employed, and which has been cited, by an eminent geologist and mining engineer, as the most perfect process now in use.

In California, too, the loss of gold has long been loudly complained of. Mr. Collins, of Grass-valley, in that state, says:—"Our present mode of operating is very rapid, but the process of *saving the gold* is very *imperfect*, not saving from ordinary rock more than *one-fourth* or *one-third* of the gold which it contains."

The Phœnix Gold Mining Company of New York, in their report, make the following remarks:—"The difficulty hitherto in gold mining from quartz has *not* been chiefly in breaking, grinding, and pulverizing the rock,—that is in itself a very simple process, and one which can be effected in a variety of ways, with a per centage of difference in rapidity; but, after the rock is pulverized, the great desideratum is to separate the *whole of the gold* from the powder. The old process is so incomplete in its results that not more than *one-sixth* to *one-third* of the gold is saved in practice, as shown by the more thorough assay of the chemist."

Volumes of evidence might be added on this subject, all of the same tenor, but the simple fact that there has been so much inventive ingenuity applied in the last few years to the production of machinery for extracting gold from its ores, is sufficient to show that a machine for the purpose of doing this work effectually, remained a desideratum.

This leads at once to the consideration of some of the methods hitherto employed for this purpose. Their number is so great that it would be impossible, in the proper limits of a paper like this, to specify them all. It will only be attempted here to indicate such as seem to be types of whole classes of appliances of the same general character.

The processes for securing gold may be divided mainly into

Washing,
Smelting,
Amalgamation.

By Washing, is meant every process which depends for its efficacy upon the superior specific gravity of the precious metal, as compared with the substances with which it is mixed, in a state of such freedom as to allow it to subside from them after being mechanically suspended in water. Of these processes, that of *panning* may be considered the type. The appliance used in this method is a shallow cone-shaped *pan or dish*, into which the auriferous sand or earth is thrown, and agitated by hand with water. The gold particles subside to the deep centre of the pan, while the lighter matters pass off with the water, which is allowed to escape over its sides. It is obvious that in such a process small particles of gold—too small to be visible to the naked eye—must be lost; for, notwithstanding its weight, gold may be so minutely divided as to float upon the surface of the water, or to remain in it, and move with it, in a state of indifference. To this class of machines belong those in which the auriferous matter, suspended in water, is allowed to pass down inclined planes, meeting in its course, at the bottom of the stream, certain obstructions, which detain the gold, while they allow the lighter matters to pass on and escape. The machinery employed in the mines of the Ural, where the work is done chiefly by stamping and washing, is an illustration of this process.

In another apparatus the hide of animals, with the hair on, and turned against the course of the stream, is employed to secure the fine auriferous particles as they find their way to the bottom of the stream. The hides are occasionally withdrawn, and freed from their precious load by washing in proper vats.

The cradle-rocker, or long-tom, of the Californian emigrant, is another application of the same principle.

The "Dolly Tub" may be used either as a washer or amalgamator. When used as a washer, the dasher or agitator is employed to mix thoroughly with water the auriferous sands or earth that may be thrown into the tub by violently agitating them. It is then withdrawn, and the suspended substances subside to the lower portion of the tub, arranging themselves in the order of their specific gravities. The water on the top is then drawn off by means of a tap in the side of the tub, when the golden particles will be found at the bottom of the remaining mass. If used as an amalgamator, the agitator is employed to bring the mercury and pulverized ore in contact with each other by the rapid revolution and agitation of the whole mass.

The process of smelting will not be further alluded to in the present paper, inasmuch as it is evidently a process not applicable to the general wants of the gold-seekers of the present day, because it requires means and appliances not within their reach. And as has been before shown, it is also a process much more expensive than the best methods now known of securing gold from its parent rock.

Next in order is the method of amalgamation, which is the one most relied upon by practical men for securing the desired product. The process of amalgamation involves, of course, the previous reduction of the ore to a finely-divided state, in which alone the mercury can seize upon the gold and secure it; and the great object hitherto had in view has been to produce machinery capable of bringing the rock to such a state of powder as to allow the mercury to be brought into complete contact with every particle of the precious metal. This has been attempted by means of machinery for crushing, stamping, and grinding.

Mere breaking down of the ore is a comparatively easy process. The question between the machines hitherto invented is simply one of the quantity of work done with a given amount of power; for they all, at greater or less expense, perform the operation of crushing to a coarse powder with about equal perfection. It is between this coarse division and an impalpable powder that the difference between different machines becomes apparent.

The machinery for pulverizing used in gold-mining districts is chiefly of three kinds: Stampers, Crushers, and Grinders. In California the principal ones in use have hitherto been the Mexican Arrastras, and the Chilian Mill.

Stampers may be driven either by machinery or by hand. There is one apparatus worked by machinery, in which vertical wooden beams are so attached to large masses of cast iron, that when raised by cams, or eccentrics, placed around a moveable axle, and corresponding with tongues attached to the lifters themselves, they fall on the ore placed beneath them, and by repeated blows reduce it to a fine powder. A large wooden trough is placed below, in which are openings filled with gratings of perforated sheet-iron. A stream of water flows through this trough, and carries out with it all the particles that are sufficiently fine to pass through the perforations in the sheet-iron. The gold contained in the powder is collected and preserved by subsidence, on the principle before described. In the hand apparatus, which is worked by a winch, the stampers are lifted and dropped by means of an endless chain, which catches into tongues on the upper ends of the stampers. The links and tongues are so arranged that the stampers are lifted and let fall in succession. An inclined table for collecting the gold by subsidence is attached to the apparatus; the arrangement for carrying off the finely-powdered ore in water being substantially the same as in the other machine. In stamping machinery there is a great loss of power by friction, as there are necessarily numerous rubbing parts. There is also another difficulty. When reduced to the state of coarse sand, the ore begins to pack beneath the pestles, and though the first coarse division is effected with great rapidity, the subsequent part of the process is extremely slow and laborious. Simple percussion, moreover, does not seem to be sufficient to reduce such substances to the state of an impalpable powder. There is needed, in addition, a rubbing or grinding motion. Indeed the ore has to be passed from the stampers to the mill, before it is supposed to be ready for the amalgamator.

In a rude form of mill, known as the "Mexican Raster," or "Arrastra," in California, the grinding is effected by the dragging or rubbing of stone mullers over a bed stone of hard granite, enclosed by a wooden tub. This process is of course slow, and the friction is immense. The reduction to fine powder is, however, most effectually accomplished. A large rough stone is sometimes rolled over the stamped and broken ore, as a modification of the above apparatus.

A crushing machine, which has attracted a good deal of public attention, and was thought at one time to promise good results, is that of Mr. Cochrane. In this machine the wheels of the Chilian Mill are replaced by balls, which are worked by the pressure of a revolving dome of iron placed above them. The idea was no doubt ingenious, but the leading defects of the Chilian Mill are retained, in addition to which there is the friction between the balls and the dome, which, as it is the source of power, must be at least equal to the work done. The basin remains horizontal, and the ore, after being pulverized, has to be amalgamated in a separate apparatus. The wear of a machine, depending for its power upon the friction of iron surfaces, must obviously be very rapid, and the resulting powder must have a very considerable admixture of iron in a state of fine division—the result of the wearing away of the superincumbent dome.

Rollers are sometimes used for crushing and reduction to a powder. The objection to them is that they do not crush the ore sufficiently fine. They only act at a single line of contact, and as there is an apparatus for imparting elasticity to prevent accidents, which allows the rollers to recede from each other when a lump of unusual hardness presents itself, much undivided ore must pass through along the whole line of the rollers whenever they are kept apart by such a contingency. This has to pass down the sieves and again be lifted and passed through the rollers. And it is found after all that the powder produced is comparatively

coarse; too much so, indeed, to admit of perfect amalgamation. All machines which come short of producing an impalpable powder, may safely be considered as failing in the most essential pre-requisite for securing all the gold from the ore. The universal complaint among the mining people is that no machinery will grind the ore sufficiently fine to permit perfect amalgamation.

The Chilian mill is undoubtedly the best of all the old contrivances for reducing gold ores. It unites several of the principles which are most essential to the perfect performance of the operation. It pulverizes, washes, and amalgamates at the same operation, and needs but a few modifications to become a neat, perfect apparatus for all those processes. In this mill large and heavy cast iron wheels move round in a trough, over the ore to be operated upon. A large quantity of quicksilver is placed in the bottom of the trough, and water is supplied at the top. The ore is ground by *the double action of rolling and grinding*, for the outer side of the wheels, which are attached to a centre shaft, must slip as well as roll. The action is like that of the mill used in potteries for grinding clay and broken earthenware. Amalgamation takes place simultaneously with the grinding, and the refuse is carried off in suspension in water.

Having spoken in terms thus favourable of the old Chilian mill, this may, perhaps, be the proper place to enumerate the qualities which it is thought a perfect gold ore reducing apparatus should possess.

First,—It should grind the ore to an impalpable powder, in order to do which it should have a combined rolling and rubbing action.

Second,—It should amalgamate at the instant of crushing.

Third,—It should amalgamate at the point of crushing or below the surface of the mercury. In order to effect this the mercury must be kept constantly at the crushing point.

Fourth,—It should heighten the affinity of the mercury for the gold by the application of heat.

Fifth,—It should lose no mercury in the process.

The first point—the necessity for fine division—has already been sufficiently insisted upon, and is indeed too obvious to need further remark.

2nd,—The necessity for amalgamating at the instant of crushing, will be apparent on reflecting that the particles of gold may be so small, or so flattened into flakes or leaves as to rise in the water and pass off with it and be lost. Or they may, in being mixed with the refuse mud, become so coated over with it, that the mercury will not seize upon them at all. There is no doubt that much loss has occurred in this way.

3rd,—Amalgamation at the bottom of the mercury is a point which seems hitherto to have escaped the attention it deserves. The surface of mercury is covered at all times with a film of oxide which must interfere materially with the perfection and rapidity of its action in amalgamating. But in addition to this it is constantly covered in practice with the mud and refuse from the grinding operation, which much increases the difficulty of bringing the whole of the gold—in its condition of flour of gold—into perfect contact with its surface. But at the bottom of the mercury both of these difficulties are entirely avoided. In order that amalgamation should take place at the bottom of the mercury, and at the instant of crushing, it is necessary that the mercury should be kept constantly at the crushing point. There it seizes upon the fine particles of gold the moment they are liberated from their rocky matrix.

The increase of attraction which takes place between gold and mercury by heat, is a point of great importance. It may be illustrated by a simple experiment. Take a sovereign and dip it in a spoonful of cold mercury, and observe what proportion it will take up. Then heat the mercury by holding a spoon over the lamp, and notice the greatly increased quantity which will cling to the coin. It was this simple trial, indeed, that resulted in an important improvement in gold amalgamating apparatus, which will shortly be noticed.

The loss of mercury has been a very serious evil in amalgamating machines. It has been broken up in the process of grinding, and passed off in a finely divided state with the refuse.

If these principles thus explained are now applied to the Chilian mill, it will be found that—

1.—The grinding of the ore is performed in this mill with a good degree of perfection, it having the rolling and rubbing motions combined.

2 and 3.—It does not amalgamate at the instant of crushing or at the bottom of the mercury, because, the trough being horizontal, and the action of the wheels being all in the same direction in the trough, a current is created around the trough, which carries mercury and ore around with it, and causes the mercury constantly to elude the lower part of the wheels where the crushing is going on.

4.—No heat is applied, but the mercury is cold and "stiff."

5.—In case it is attempted to grind and amalgamate with comparatively little water, the mercury is very badly broken up by the action of the wheels, and much loss is the consequence. With a greater quantity of water the current produced operates as before described, to carry the mercury away from the crushing point, and also to wash the powdered ore away before it has been sufficiently operated upon. In the opposite case the wheels have to do more work than necessary, as they pass many times over the ore which has already been pulverized.

It is obvious, then, that the Chilian mill, while it fulfils some of the requisites of a perfect apparatus, falls short of others of the greatest importance.

The only process which seems hitherto to have answered all the five conditions necessary to amalgamating apparatus, is what is called at the diggings the miner's assay—a method employed at the mines for determining the value of ores which it is proposed to work. In this process the mortar and pestle are employed. Mercury is put in the mortar, the ore to be tested is thrown in and covered with *hot water*, when the operation begins. The pulverization is perfectly effected by the *rolling* and *grinding*, or rubbing action of the spherical end of the pestle; the mercury is kept at the point of crushing in the bottom of the mortar, and is kept heated by the boiling water. Here, then, are all the necessary conditions—perfect pulverization, and instant amalgamation, by pure and hot mercury. On a large scale, the cost of heating sufficient water to attain the result here indicated would, of course, be a great practical difficulty. Some other method of heating would have to be adopted.

Those who have seen Mr. Berdan's machine will at once perceive that it embraces every principle of the miner's assay, while it avoids the expensive process of heating water in large quantities. The inventor is a practical and scientific mechanic, whose attention has long been directed to the subject, and the invention has been produced at great labour and expense. In order to obtain all the information bearing upon the subject, Mr. Berdan sent two practical engineers to California, with instructions to study the wants of the miner, and all the appliances which had been adopted to supply them. It was upon a full report of all the facts in the case, that he set about the production of this machine, which really seems to have met the requirements. It performs, at one operation, the pulverizing, washing, and amalgamating of the ore.

The construction of the apparatus is simple. It consists of a cast-iron basin, seven feet in diameter, revolving upon an inclined axis or shaft. In this basin are placed two cast-iron balls, the larger one thirty-four inches in diameter, and weighing two and a half tons, the smaller one twenty-four inches in diameter, and weighing one ton. Under the basin, and attached to and revolving with it, is a furnace of conical form. The whole is hung in a

strong framework of timber, and receives motion from hand, horse, or steam power, by means of simple cog-gearing.

The operation is as follows:—Fire is made in the furnace beneath the basin; quicksilver is placed in the basin, and the auriferous ore is thrown in, in lumps of considerable size. The apparatus is then set in motion; the balls, by their gravity, revolving in a direction opposite to that of the basin. The two balls, moving in contact with each other and with the inclined bottom of the basin, receive a spiral as well as a rotary motion—a combination which is found to possess the greatest efficiency in the pulverization of the ore. The ore is brought under the balls, and instantly crushed to an impalpable powder. The crushing is effected, of course, at the point of contact between the large ball and basin, and below the surface of the mercury. Thus, the moment the gold is disengaged, it comes in contact with pure and heated mercury, which seizes upon and secures it. The refuse powder rises to the surface of the quicksilver, whence it is carried off, in the form of a thin paste, by a small stream of water, which runs in at the upper side of the basin, and escapes through suitable openings, just below its rim, into a trough placed for the purpose. The tailings, or refuse, may thus be preserved for analysis if desired.

The novel features of the machine are both mechanical and chemical. The arrangement of an inclined revolving basin in connection with balls of corresponding size and weight, produces a rolling and grinding motion, which it is believed has never heretofore been attained. The chemical novelty consists in the heating of the mercury, which has never been attempted on a large scale before.

It is to be observed that this machine is not simply a crusher, but that it does *all the work* necessary to secure the desired product in combination with mercury. It crushes, washes, and amalgamates at one and the same operation. The simplicity of its parts, the almost entire avoidance of friction in its gearing, and the trifling power required to work it, render it an important addition to mining machinery, and worthy of being subjected to every test that practical and scientific men can devise. It is found that a machine consisting of four basins in one frame, will pulverize, wash, and amalgamate about forty tons of ore, of average hardness, in ten hours, with fifteen-horse power. Any number of basins can be used in one frame, and driven by one main shaft.

The peculiarities of this invention do not consist in the use of balls and basins; but, 1st,—The inclining of the shaft on which the basin revolves, which keeps the mercury always at the crushing point, and causes the balls to work by gravity. 2nd,—The production of a combined rolling and grinding action by the contact of the balls; and, 3rd,—The addition of heat to the mercury by means of the furnace below the basin. No machine which does not combine these three peculiarities, can be considered as having a resemblance to Berdan's. This machine—

1. Grinds the ore to an impalpable powder.
2. It amalgamates at the instant of crushing.
3. It amalgamates below the surface of the mercury.
4. It heats the mercury used in amalgamating.
5. It has attached to it an auxiliary machine, which entirely prevents loss of mercury.

This auxiliary machine is called a separator, and is as simple in its construction as the principal machine. The refuse of the tailings from the large machine pass by suitable troughs to the funnel at the top of the separator. Thence they descend the central tube, and, filling the hollow arms, pass out in thin sheets through narrow slots at the bottom of a large mass of mercury. In passing up through this mass, all the broken mercury is detained by the attraction between it and the mass. The subsidence of the powder in sufficient quantity to clog the machine is prevented by the revolving wings, which move just above the surface of the mercury, in a direction opposite to that of the hollow arms, and by their inclined position constantly urge the contained matters to the top of the vessels, where they escape through a proper exit spout.

DISCUSSION.

The CHAIRMAN said, he was sure they must all feel obliged to Mr. Stansbury for his very interesting paper, and he begged to move a vote of thanks to that gentleman.

The vote having been passed,

Professor TENNANT being called upon to address the meeting, said, he could not give any information relative to Berdan's machine, not having had an opportunity of witnessing its working, though he had had many invitations to do so. In reference to the observations implying that large quantities of gold were to be found in this country, he was afraid the public mind might be led to believe they were about to have a California or Australia at home. Now there was no instance in which the workings for gold in the British Islands had been ultimately productive. In every case it had been found that it cost 33s. or 40s. to obtain one pound's worth of gold. Some years since, gold was found in the Highlands of Scotland, on the property of the Marquis of Breadalbane, who proposed to work it, until he was assured it would cost from 30s. to 40s. for every sovereign obtained. The condition of the gold in this country, and Australia and California, was very different—in the latter places, nature having been at work for many centuries in decomposing the rocks from which the gold was washed down into the rivers and streams, from which it was comparatively easily obtained. Attempts had been made to produce gold from the quartz, but he was not aware that either in Australia, or California, results had yet been obtained to prove it could be worked at a profit.

Mr. MOGFORD, of the Poltimore Mining Company, said, after the observations of the last speaker he felt bound to make a few remarks. The Poltimore mines, in Devonshire, had been at work for the last twelve months, and 40 tons of ore had been sent to Messrs. Rawlings and Watson, of St. Helens, near Liverpool, for reduction. The cost had been: In bringing the ore to grass 3s. per ton, freight 17s., and reduction 30s., whilst the produce had been about 50 oz. of gold. Since that time, 120 tons had been sent to the Messrs. Rawlings for reduction, who, after deducting every charge, had sent them a cheque for 170*l*. or 180*l*., as the profit. They had since entered into an engagement with Mr. Berdan to erect machines at the mines, where there was an almost unlimited supply of gossan, from which they expected to obtain gold at an expense not exceeding 10s. per ton. They had tested the machines at Mr. Berdan's, in the presence of Mr. John Wilson, of the firm of Rawlings and Watson, when the brown gossan, of which there were specimens in that room, produced 13 dwt. of gold to the ton, and the red gossan 32 dwt.—and Mr. Wilson expressed himself perfectly satisfied with the working—the reduction which, under the system of his firm, would have cost 30s. per ton, being made at a comparatively trifling cost. He believed that, in twelve months, they would be in a condition to prove that gold could be most profitably produced in England. There was one circumstance to which he wished to call attention, as having a great effect in discouraging mining operations in England—the right of the Crown to a proportion of all the produce. He trusted, now that free trade was established—the relic of feudal times of the Crown claiming a royalty on all metals produced in the British Islands, would be done away with. In reply to questions by the chairman, Mr. Mogford said, they possessed miles of gossan, and some of it lay close to the surface—they also had quartz, but that principally yielded copper. The utmost depth they had yet sunk was 40 fathoms. These mines appeared, from the massive stone works in them, to have been formerly worked by the Saxons, as they were certainly not of more modern date. Sir Henry de la Beche had examined their ores, and pronounced favourably upon them. In fact, the only question now to be settled was, whether

they could be worked profitably, and of that he had no doubt.

Mr. Perkes said there had been many inventions brought from America, which afterwards proved to be English. He maintained that such was the case with regard to Berdan's machine, which he (Mr. P.) had publicly advertised to be an infringement of his patent, and he was about to take legal proceedings against that gentleman to prove his rights. He denied that Berdan's machine would do all that Mr. Stansbury had stated, and maintained that the friction of the balls and pan must be immense. The Chilian mills were not the most perfect, neither were Mr. Berdan's machines, and he would challenge them that they could not do with a dozen pans and balls what he would do with his conical rolling machine—one of which would be ready for experimentalising with in about three weeks. With regard to what Mr. Tennant had said, that gold could not be produced at less than 30s. or 40s. per ton, he was prepared to prove it might be obtained for 5s. per ton, and even, from soft gossan, at 3s. 6d. per ton, and he believed the time was not far distant when they would show as good diggings in England as in Australia or California.

Professor Tennant said, it was very necessary, in discussing this question, to distinguish between quartz and gossan. Gossan was decomposed rock, and of course might be reduced at a very small cost. They might, however—so uncertain was it—take up one portion, one-fifth of which should be gold, whilst the next and immediately adjoining portion did not contain a particle of the precious ore. It was generally found in threads, and he had seen portions of Australian ore in which the irregularities he had alluded to were peculiarly marked. Gossan, as understood in Devonshire and Cornwall, was a very indefinite term, something like mundic—a term there applied to all yellow ore Thus he had asked a mining captain, "What is this?" and was informed mundic, the substance consisting principally of iron; a similar answer had been given him respecting ore containing copper pyrites, and again upon some containing arsenic and iron pyrites.

The Chairman said, that in the mining districts parties who were called streamers were in the habit of collecting gold in quills which they corked up and sold to the jewellers.

Professor Tennant was aware of that fact, and that the gold was generally purer than the standard. The same system was adopted on the coast of Africa, but there they were also in the habit of filing up brass kettles and mixing the filings with the gold, selling it all for gold dust. The imposition, however, might easily be discovered by nitric acid, which would dissolve the brass without touching the gold.

Mr. Coleman did not profess to be a scientific man, and, without wishing to call in question the good taste of Mr. Perkes' observation with regard to Mr. Berdan's machine, he might observe that he had seen a correspondence between the gentlemen which seemed to prove to him that Mr. Perkes had but a poor case, or he would have been more active in taking proceedings against Mr. Berdan. With reference to what had been said, that they were not to suppose that they had found a California or Australia in Great Britain, he might observe he had just returned from Wales, where he had been to inspect the Cwmheisian Mines. He had there seen large quantities of valuable quartz rock, some of which he had tested since he came to London, when the gold was found to be equal to ¾ oz. per ton. He believed he was right in saying that the Sir John del Rey Company, which was paying a dividend of twenty-five per cent., and its shares being quoted at 40*l.* for 15*l.* paid, had never produced more than half an ounce to the ton; and a report of the Brazilian Mining Company, in the last *Mining Journal*, showed that their average produce was less than 2 dwts. to the ton, and yet he was assured by a gentleman connected with that company, that they were quite satisfied it would amply pay them. He thought, looking at these facts, that there was no reason to doubt gold might be obtained and advantageously worked in this country.

Mr. Mogford wished to observe, in reference to what Mr. Perkes had said of the inefficiency of Berdan's machine, that he had offered to construct those machines for their Company at 600*l.* less than Mr. Berdan.

Mr. Perkes might observe, in reference to what had been stated about his correspondence with Mr. Berdan, that the only reason an injunction had not yet been applied for was the fact that some little matters were overclaimed in their specification; as soon as these had been disclaimed proceedings would go on.

Mr. Woolmer was quite sure the meeting had nothing to do with the law of the question now before them. He attended there as connected with the Arundel mines in Devonshire, the "mundic" from which they had every reason to believe contained large quantities of gold. He now begged to put at the disposal, either of Mr. Perkes or Mr. Berdan, 5 tons of the mundic, to be tried as to its value under any scientific inspection that might be thought desirable. He was informed there was also a large quantity of valuable gossan at the mine, which might open up an important sphere of industry in Great Britain, should the results prove equal to expectation. Should either or both the gentlemen he had named be desirous of trying an experiment on the value of the ore, 5 tons should be placed at his disposal for the purpose, free of expense; and he believed that that quantity would be generally considered sufficient to give a fair example of what they might expect from the mine.

Mr. Perkes would at once accept the offer.

Mr. John Calvert said, since his return from Australia, he had devoted his energies to seeing whether gold was not to be found in England; as he thought, from its geological formation, there was every reason to believe it was peculiarly rich in gold. Indeed, he had tested upwards of 300 specimens, and he had no hesitation in saying that richer was not to be found in the world. They were too much in the habit of thinking that gold could only be found in hot countries, and Englishmen would not believe that it could be found in the country in which they lived. In the antipodes they searched diligently for their riches, which was not the case in England. He had travelled very extensively, and he had no hesitation in saying that there was no country so rich in gold as England; and he believed that much quartz would shortly be found, which would not only yield half an ounce, but five or six ounces a ton. He expected, in a very short time, to see these riches developed to an enormous extent; the only difficulty in its production having been hitherto the crude method of working adopted.

Mr. Harry Chester did not wish to give any opinion on the merits of the invention brought before them that evening by Mr. Stansbury, or on the probabilities of large fortunes being obtained from gold discoveries in England. They had given a vote of thanks to Mr. Stansbury for his paper, but that did not pledge the Society of Arts to an approval of the sentiments expressed in it. Neither was the Society responsible for observations made in that room, as they held an open session, in which many gentlemen were allowed to express their opinions who had no further connection with the Society than that of taking an interest in the discussion of the evening. The purpose for which he rose was to suggest that Mr. Berdan's invention should be submitted to the Standing Committee of the Society, "On Mining, Quarrying, Metallurgical Operations and Mineral Products," to report upon its value. That committee consisted of Professor Ansted, Mr. Wm. Bird, and Mr. Thos. Sopwith. They would make a full report upon the subject, and if the invention possessed merits, the results of the experiments would prove them; but if it was a failure the sooner the public mind was disabused on the subject the better.

Mr. Stansbury, speaking on the part of Mr. Berdan, had no hesitation in saying that he would be most happy to have the machine subjected to any test the Society

could put it to. He would say further, that the fullest inquiry was courted. They had from the first placed the machine under the control of any persons or companies choosing to use it, either bringing their own quicksilver or using that upon the premises, no party connected with the machine, even for a moment, interfering with the working. Fifty or sixty experiments had been made by companies in the presence of scientific men, and he believed they had all proved satisfactory—at all events, they had heard nothing to the contrary. Indeed, in no instance had they ever discovered any gold in the tailings excepting once, and that was in a case were the gold had been reduced to a fine powder before being placed in the amalgamator; nor had there been any mercury found in them, since the introduction of the separator. The experiments with the amalgamator had been made with 700, 1000, or 2000lbs. at a time; and, surely, the results for such quantities must be more satisfactory than those from the mere thimblefuls used by the general assayists. And yet, from the report upon these thimblefuls of dust, produced from the powdered ore, were large and important companies continually established.

The SECRETARY announced that at the next meeting, on the 30th of November, a paper would be read "On the Consumption of Smoke," by Mr. A. Fraser.

GARANCINE AND THE JUICE OF THE MUDDAR.

AT the meeting of the Society on Wednesday evening, a sample of garancine, or the colouring matter of the munjeet or Indian Madder, and also a block of the juice of the ak or mŭddār plant, which it is proposed to use as a substitute for gutta percha, were exhibited. Specimens of the raw fibre of the mŭddār plant, of raw and bleached thread, of twisted and coarse twine, and of cord and rope manufactured from this fibre, were also shown. Full particulars respecting these substances will be found in Vol. I. of the JOURNAL, page 597.

NEW ZEALAND FLAX.

THE Council have received from the New Zealand Society the one ton of *Phormium Tenax*, or New Zealand Flax, mentioned in a previous number of the JOURNAL (*vide* Vol. I. page 533), which has been cleansed in rather an inferior manner to the usual mode, and has had much less labour bestowed upon it than native-dressed flax. The object of the New Zealand Society in sending this sample, is to enable experiments to be made, with a view to the introduction and application of such machinery and processes as might lead to improvements in the preparation of the flax, so as to render it fit for exportation. The New Zealand Society has placed in the hands of the Council a draft for 50 guineas, which they are willing should be awarded to any person who will furnish them with modes of operation, models and specifications of machinery, by which the flax may be dressed at a cost not exceeding 5*l.* per ton, (this price to prepare the flax as a raw material), reckoning the wages of an ordinary labourer at 4s. per diem, and of artisans at 6s. to 6s. 6d. The machine to be of two kinds; one analogous to the old spinning wheel, that may be used in every cottage or shepherd's hut, and the other suitable for more extensive operations.

BIRMINGHAM AND MIDLAND INSTITUTE FOR INDUSTRIAL EDUCATION.

It was announced in the columns of "The Times," as a great fact, during the progress of the discussion on the Corn Laws, that Manchester had in one evening contributed to help forward the movement £70,000. It is also a great fact that on the evening of Thursday last, the 17th of November, upwards of 5,000 people filled the Town Hall of Birmingham, to listen to four hours' talk about science and art, the necessity which existed for Industrial Education, and the means which were about to be afforded for forwarding the same. Captain Tindal occupied the chair, and there were present not a few country gentlemen, clergymen, leading manufacturers, and useful members of the community, known for their attachment to the progress of imperial education and the diffusion of useful knowledge among the people.

The chairman opened the proceedings, introducing to the meeting Mr. Henry Cole, one of the Secretaries to the Department of Practical Art and Science, and regretting the absence of Dr. Lyon Playfair, whose letter of apology he read.

The Chairman said:—It is proposed that the Institute shall consist of two departments; one a General Department; the other, Schools of Industrial Science. Under the former head will be embraced—1st, The *Literary Branch*, comprising general and reference Libraries, Reading Rooms, accommodation, as far as may be practicable, for the Literary Societies of the town, and Lectures on subjects kindred to this branch; 2nd, *Museums*; 3rd, *a Collection of Mining Records*; 4th, *Lectures on general scientific subjects*; 5th, *Periodical Meetings* for the reading and discussion of original communications, upon the plan af the sections of the British Association; and 6th, *a Gallery of Fine Arts*, for the reception of examples of Painting aud Sculpture. The second department is even of more importance, inasmuch as it has reference to the scientific instruction of artisans in the principles of their daily avocations. The other department will be a School of Industrial Science, the members of which will be provided with systematic lectures and class instruction in the various branches of science, with especial reference to their particular occupations; and will also partake of the most important advantages of the general department. The lectures will include Chemistry, as applied to the various manufactures, and agriculture, mechanics, metallurgy, mineralogy, and geology, ventilation of mines, and mining engineering. The Institute will occupy an intermediate position between the ordinary school education, and that of the Queen's College. It will provide for the working man a knowledge of the laws of these Sciences which enter into his every day employment, and thereby substitute scientific knowledge for empiricism and practice. The Town Council had granted them a site—it remained for the public themselves to say, whether the scheme was to be carried out in all its entirety, or whether they would allow any little petty parsimonious feeling to interfere with the erection of a building, worthy of the purposes to which it was to be devoted.

Sir Robert Peel in proposing the first resolution.—

"That it is essential to the full development of the resources of this district, rich in its mines and manufactures, that ample provision be made for the instruction of the industrial classes in the principles of science and art," said, that Birmingham had a position to maintain, which could only be done by the most earnest efforts, and by providing the means of Industrial Education in such an

Institution as that which they had this evening met to help forward. Government had now recognized the necessity of education, and had expended last year 400,000*l*. for purposes of procuring instruction in Science and Art. As an incentive to exertion, he pointed to what was being done by Holland, France, Switzerland, and the United States of America; while France with schools of Manufactures, Polytechiny, and Fine Arts, distanced all competitors in the race of supplying high class Industrial Education; and were they to permit France and the United States to make greater provision than themselves. They had hitherto been the foremost in the march of civilisation, and if they meant to maintain that position they must unite all their efforts, as by this alone would they be enabled to keep pace with their competitors. What were the special characteristics of their local industry? He was told—and he had taken the trouble to carefully ascertain it—that there were about two hundred trades in this locality. Amongst them were some which, by the excellence of their manufacture and the facilities possessed in manufacturing, they had made entirely their own; unless, therefore, they gave to the working classes opportunities of acquiring a knowledge of mechanical science, of artistic education, and of the application of steam power, no matter what their present reputation was, one generation would suffice to sweep it away. If he rightly understood the objects of the Birmingham and Midland Institute, it would educate the practical miner, the artisan, and others, in the principles involved in their daily avocations; it would afford to them a knowledge not only of the principles of mechanics, but also of those tools and machines which were best suited for the working of iron and metals generally. He considered that ignorance was a burden to the country, in the shape of poor and other rates; do away with it, and they would need fewer poor houses and jails. He then glanced at the effect of emigration in creating a demand for labour—alluded to the disastrous effect of strikes, such as are at present going on, and to the importance of the reformation of juvenile offenders. He would remind the working man that the paths of honour were in this country open to all; the working classes could point to hundreds of themselves who have risen to the proudest pinnacles of human ambition. Rome reconciled the nations. She subdued by the cultivation of the Arts. This was a policy which might be followed with advantage by England. He would urge the working classes to rally round the standard of Education; it would lead them not certainly to territorial conquests, but under the more benign influences of the Arts, it would extend the blessings of education to the remotest limits of the vast empire.

Mr. Scholefield, M.P., in seconding the resolution, spoke of the need of such an institution as that contemplated. He pointed out the causes of failure in previous institutions which had been begun in the town. Their efforts, he thought, had been too isolated and too much scattered. They had failed, moreover, by looking upon these institutions too much as things of a class, though those that had been established possessed general advantages to a greater or less extent, but each had been of itself imperfect and inefficient. There was one feature in it that he regarded of the utmost importance, that which had reference to the cultivation of industrial science. They had for a great number of years flattered themselves that this country took the lead of the world in manufacturing industry. He said that the supremacy of this country in manufactures was now threatened. Not so much threatened, however, by France and Germany as by the United States. To the working classes, it was a matter of life and death; and let them remember that intellect and skill meant high wages, —meant moral, social, and political elevation. It was for these reasons he asked all classes—rich and poor, capitalist and labourer—to come forward and assist in this good work.

Sir E. F. Scott supported the resolution.

The Rev. E. H. Gifford, Head Master of the Free Grammar School, then moved the resolution: "That the Birmingham and Midland Institute having for its primary object the education of our miners and artisans in the scientific principles of their daily avocations, and at the same time making provision for the literary and scientific acquirements of other classes, is entitled to the general and cordial support of the inhabitants of this town and district." He remarked that he (Mr. Gifford) believed it would be recognised as a sound rule of the economy of labour to employ in each instrument, and in each agent, that particular quality which was most rare and valuable, and to apply each machine and each workman to those particular branches of work which could not be performed at all, or could not be performed so well, by inferior agents. Let them apply that rule to man, and he would venture to maintain that the chief value of man, viewed thus, lay not in hand or in arm, in bone or in muscle, but in that intellect which enlightened and informed, that moral will and purpose which animated and controlled every movement of the frame so fearfully and wonderfully made. It was perfectly obvious that by rendering the artisan more intelligent, and so more skilful, we were increasing the industrial resources and the profitable powers of our country. He was not one of those who thought or seemed to think that ignorance was the only soil in which religion could flourish. Their Institute did not encroach upon the province of general education. By it they now sought to give to those who either had been or were still receiving a general education in their schools, the opportunity of extending their knowledge by studying such branches of science as might be useful to them in after life.

Mr. S. H. Blackwell, of Dudley, seconded the resolution. He trusted that as an employer of labour he might be allowed to congratulate the meeting on the fact that the very presence of so large and so important an assembly was, indeed, a convincing proof that they were at length arousing themselves to a sense of the necessity of giving to the working classes a higher class of education than had hitherto been afforded to them. It was no wonder to him that in Birmingham, the centre of a great industrial district, this truth had been discerned. It was, on the contrary, a wonder that it had not been acted on long ago—for if they regarded the question involved in the establishment of the Institute even in the lowest point of view—that of self-interest—they would be convinced that they could not work more efficiently for their own interests, or to the advantage of those connected with them, than by the circulation of education over as wide a range as possible. He would ask those who doubted this truth to compare the past life of the world to that of the present day. He would ask to whom they owed the railroads?—the electric telegraph?—the steamships bridging over the vast waters of the Atlantic? The answer was the same there. These things were the result of the combined wisdom, science, and skill, not of individuals but of great classes, in which they saw the energy and enterprise of the capitalist, and the educated hand of the artisan, as well as the rude labour of the unskilled workman. And he would ask if the progress which the world had made up to this time was a boon—if the progress towards a clearer knowledge of the natural laws by which the world was governed was a boon? Who would doubt this? And if that progress was the expression of the knowledge which society had acquired, ought they not to hail every opportunity of making that knowledge as universal as the name of man?

The Hon. and Rev. Grantham Yorke, in introducing the third resolution, namely,—

"That the study of ornamental art in this town will be greatly promoted by the proposed association of the Government School of Design with the Institute," dwelt more particularly on the value of elementary instruction; if such was not attended to, he felt assured the proposed Institution would lack students. It was

essentially necessary that education, in its earlier stages, should be remodelled, and an element introduced into it at present in abeyance. In this view of the matter he was borne out by the letter of Dr. Playfair and the observations of Sir R. Kane, in respect to the Queen's College at Cork. They should endeavour to unite the interests of the Institute with the elementary schools, from which they would draw from time to time a class of youths fitted to receive its class instructions. Now he very heartily supported that resolution; but it needed some explanation. He thought that the association of the Government School of Ornamental Art with the Institute would be a mutual advantage; but he could not assent to the proposition that it required that conbination to promote the study of ornamental art in the town. They must either teach elementary branches in the Institute, or they must provide that those who came there must have elementary instruction before. It was an absurdity—it would never do—to provide elementary schools in the Institute—and he did not see how it could be done except by giving a sort of premium to the schools below it.

Mr. Peter Hollins, in seconding the resolution, alluded to the importance of Art to Birmingham, and explained, at some length, the causes which led to the foundation of the Society of Artists. By transferring the present School of Design to the buildings of the Institute, when erected, two bodies would be benefited, namely, the School of Design by increased accommodation, and the Society of Artists with rooms better fitted for their annual exhibitions. Nobody would tell him that the manufacturer did not need education as well as the artizan; they must educate the employer and the public to.

Mr. H. Cole, C.B., said the proposer of the first resolution had reminded them that the year 1831 was memorable in connection with the Reform Bill, and that the present year would in times to come be regarded as an equally important epoch in the history of the Education question. Now, he (Mr. Cole) would say, that as Birmingham took perhaps the lead in the political movement of 1831, so he thought he might fairly say that it was now the first town to take the lead in the movement for promoting industrial education. It seemed to him perfectly natural that it should be so, for if there was any one town in the kingdom where mind, and hand labour, and machinery, were all so united together—where machinery alone did not bear a preponderance, as it did in many towns—where, in fact, the human agent guiding that machinery and guided by it, was able to produce the de[illegible] of his work in exact proportion as he was educated—then that town was Birmingham. It therefore seemed to him that they were consulting exactly their own interests in endeavouring to procure the best possible industrial education—but he would be misleading them if he did not show that there were difficulties to be overcome before they could hope to attain success. After they had got their Institute erected—let their building be as spacious as it might, their professors the most eminent men that could be found, their capital not at all stinted—it would undoubtedly prove a lamentable failure unless care was taken to sow the seed beforehand in the manner which had been explained by Mr. Yorke. The past fifteen years' experience of the department of Government with which he was connected had proved that the planting of institutions such as that, and expecting them to grow up in soils where no seed had been sown, was as hopeless as the expectation that oak trees would grow without acorns being thrown into the ground. Government and individuals had been trying their hand at the establishment of Schools of Design, but for want of [illegible] foundations they had been more or less failures. [illegible] must, therefore, in primary [illegible] dation for their new Institute [illegible] reliance on the [illegible] the maintenance of [illegible] supporting. [illegible]

derived one-half from Government, and the other part from low fees (or no fees at all) and charitable subscriptions. Now this was after sixteen years' existence; but in Dudley an elementary School of Design had been founded within the last six months, which, with no subsidiary from Government except in the shape of a well-trained master whom the pupils themselves paid [illegible] more students in it than they had in Birmingham.

The Ven. Archdeacon Sandford, then moved "That the artisans of this town and district, being [illegible] interested in the success of the undertaking [illegible] co-operate with the committee in the [illegible] the Institute." He was glad, he said, that [illegible] had been assigned to him that spoke of the [illegible] Birmingham, with whom he had [illegible] men whose thews and sinews, whose industry and talents had made Birmingham [illegible] their cousins across the Atlantic had [illegible] progression; they could even teach a [illegible] clubs and the Admiralty of England [illegible] a good stroke of business in hardware [illegible] whom might they never have [illegible] peace—would be glad to outstrip [illegible] line. It was therefore of the first [illegible] workmen should be intelligent [illegible] those who worked in metals should [illegible] with chemistry, metallurgy and [illegible]

Mr. Geo. Wallis seconded [illegible] believed if the artisans did [illegible] would be established in [illegible] they could do, he would [illegible] ing men of Manchester [illegible] park; and the artisans of [illegible] sufficient to put up a splendid [illegible] of America were the most [illegible] found in the world. [illegible] was spent in primary [illegible] of Boston. They [illegible] to the importance of [illegible] behind in the question [illegible] question of the [illegible] question in which [illegible] warder than they [illegible]

Mr. Thomas [illegible] felt great pleasure [illegible] that the proposed [illegible] ing benefit [illegible] opinion it would [illegible] knowledge [illegible] to the work[illegible] could [illegible] tion [illegible] Institute [illegible] pleasure [illegible] that Birm[illegible] the work[illegible] hour [illegible] manner [illegible]

			.5g
			.31g
			6.50g
			6.50g
			6.53g
			6.25g
			4.85h
			5.85i
			4.36i
		1	7.13j
		1	6.81k
		1	6.13l
		1	6.65m
		1	6.13n
	.35	1	7.62o
	.1.07	1	5.96o
	61.33	1	8.88o
	68.81	1	4.52o
	87.22	1	4.50o
...	1125.0p	—	—
...	966.0p	—	—
...	555.0p	—	—
...	604.0p	—	—
1.10	74.70q	—	—
1.18	51.72q	—	—
2.41	61.54r	—	—

...ners, Hard Labour, for terms exceeding 4 month...
...nent.
...on supplied from the India House.
...represent Extreme cases, mentioned by the fo... Ross, 1835, p. 448. Parry, 1823, p. 413. Cocl... ...eff. Barrow, pp. 152, 258. Richardson, ... Diet.
...and Dorsetshire. See Agric. Cyclopædia.
...ay—Return in Bombay Prison Dietaries.

ON THE FOOD OF MAN. (*a*)

By Dr. Lyon Playfair, C.B., F.R.S.

The author commenced by adverting to our very imperfect acquaintance with the statistics of Food. We are still ignorant regarding the quantity of the different proximate constituents of aliment necessary for man's sustenance, even in his healthy and normal condition. If the question were asked—How much carbon should an adult man consume daily?— there would be scarcely more than one reliable answer, viz., that the soldiers of the body-guard of the Duke of Darmstadt eat about 11 oz.(*b*) of carbon in the daily supply of food.

If again the question were asked—How much flesh-forming matter supports an adult man in a normal condition?—no positive answer could be given. Even, as respects the relation between the carbon in the flesh-forming matter and that of the heat-givers, we have no reliable information. It is true that certain theoretical conclutions on this head have been drawn from the composition of flour, but no real statistical answer deduced from actual experience exists.

When we inquire into the cause of our ignorance on these points, it is found that the progress to knowledge is surrounded with difficulties. Neither chemistry nor physiology is in a sufficiently advanced state to grapple satisfactorily with the subject of nutrition. For example, we know that albumen in an egg is the starting-point for a whole series of tissues; that out of the egg comes feathers, claws, fibrine, membranes, cells, blood corpuscles, nerves, &c., but only the result is known to us; the intermediate changes and their causes are quite unknown. After all, this is but a rude and unsatisfactory knowledge. Hence, when we approach the subject it is only to deal with very rough generalities. Admitting that the experience of man in diet is worth something, it is possible to arrive at some conclusions by the *statistical* method—that is, by accepting experience in diet and analyzing that experience. Take, for example, the one general line of Pauper Diet for the English counties placed in the table at the end of this notice. The mode of arriving at the result of experience, in the case of paupers, was to collect it from *every* workhouse in the kingdom, and then to reduce it to one line. But the labour of this is immense. In the preparation of this one line the following work had to be performed in acquiring the data.:

Number of Unions applied to	542
Number of Explanatory letters sent to them	700
Number of Calculations to reduce the results	47,696
Number of Additions of the above calculations	6,868
Number of Extra hours, *beyond the office hours*, paid to a Clerk for the reduction . . .	1,248

The statistical method, besides being very laborious, is extremely tedious, and has thus deterred persons from encountering it. In giving, therefore, an example of some of the results which have been collected within the last few years, they will represent much labour, but very little or no originality.

The lecturer then alluded shortly to the conditions in nutrition, which must be borne in mind in looking at these results. It was now admitted that the heat of the body was due to the combustion of the unazotised ingredients of food. Man inspires annually about 7 cwt. of oxygen, and about one-fifth of this burns some constituent and produces heat. The whole carbon in the blood would thus be burned away in about three days, unless new fuel were introduced as food. The amount of food necessary depends upon the number of respirations, the rapidity of the pulsations, and the relative capacity of the lungs. Cold increases the number of respirations and heat diminishes them; and the lecturer cited well known cases of the voracity of residents in Arctic Regions, although he admitted, as an anomaly, that the inhabitants of tropical climates often show a predilection for fatty or carbonaceous bodies. He then drew attention to the extraordinary records of Arctic dietaries shown in the table, which, admitting that they are extreme cases, even in the Arctic Regions, are nevertheless very surprising.

Dr. Playfair then alluded to the second great class of food ingredients, viz., those of the same composition as flesh. Beccaria, in 1742, pointed to the close resemblance between these ingredients of flesh, and asked "Is it not true that we are composed of the same substances which serve as our nourishment?" In fact the simplicity of this view is now generally acknowledged; and albumen, gluten, casein, &c., are now recognized as flesh-formers in the same sense that any animal aliment is. After alluding to the mineral ingredients, attention was directed to a diet-table, which contained some modifications, but was based on the one published in the *Agricultural Cyclopædia* under the article *Diet*; the table as shown being used in the calculation of the dietaries.

The old mode of estimating the value of dietaries, by merely giving the total number of ounces of solid food used daily or weekly, and quite irrespective of its composition, was shown to be quite erroneous; and an instance was given of an agricultural labourer in Gloucestershire, who in the year of the potato famine subsisted chiefly on flour, consuming 163 ounces weekly, which contained 26 ounces of flesh-formers. When potatoes cheapened, he returned to a potato-diet, and now eat 321 ounces weekly, although his true nutriment in flesh-formers was only about eight or ten ounces. He showed this further, by calling attention to the six pauper dietaries formerly recommended, to the difference between the salt and fresh meat dietary of the sailor, &c., all of which, relying on absolute weight alone, had in reality no relation in equivalent nutritive value.

Attention was now directed to the diagrams exemplifying dietaries. Taking the soldier and sailor as illustrating healthy adult men, they consumed weekly about 35 ounces of flesh-formers, 70 to 74 ounces of carbon, the relation of the carbon in the flesh-formers to that of the heat-givers being 1 : 3. If the dietaries of the aged were contrasted with this, it would be found that they consumed less flesh-formers (25—30 ounces), but rather more heat-givers (72—78 ounces); the relation of carbon in the former to that of the latter being about 1 : 5. The young boy, about ten or twelve years of age, consumed about 17 ounces weekly, or about half the flesh-formers of the adult man; the carbon being about 58 ounces weekly, and the relation of the two carbons being nearly 1 : 5¼. The circumstances under which persons are placed influence these proportions considerably. In workhouses and prisons the warmth renders less necessary a large amount of food-fuel to the body; while the relative amount of labour determines the greater or less amount of flesh-formers. Accordingly it is observed that the latter are increased to the prisoners exposed to hard labour. From the quantity of flesh-formers in food, we may estimate approximatively the rate of change in the body. Now a man weighing 140 lbs. has about 4 lbs. of flesh in blood, 27½ lbs. in his muscular substance, &c., and about 5lbs. of nitrogenous matter in the bones. These 37 lbs. would be received in food in about eighteen weeks; or, in other words, that period might represent the time required for the change of the tissues, if all changed with equal rapidity, which is, however, not at all probable.

All the carbon taken as food is not burned in the body, part of it being excreted with the waste matter. Supposing the respirations to be 18 per minute, a man expires about 8.59 oz. of carbon daily, the remainder of the carbon appearing in the excreted matter.

In conclusion, Dr. Playfair explained how the dietary-tables elucidated the various admixtures of food common to cookery, and how they might even be made to bear on certain national characteristics, which were in no small degree influenced by the aliments of different nations.

(*a*) This is an Abstract of a Lecture given at the Weekly Evening Meeting at the Royal Institution. Friday, May 6, 1853.

(*b*) Liebig states it at a higher amount, but this is a re-calculation from the new food tables.

EXAMPLES OF DIETARIES AS SHOWN IN THE DIAGRAMS.

REMARKS.	Weight in Ounces per Week.	Nitrogenous Ingredients.	Substances free from Nitrogen.	Mineral Matter.	Carbon.	Proportion between: Carbon in Flesh-Formers.	Proportion between: Carbon in Heat-Givers.
DIETARIES OF SOLDIERS AND SAILORS.							
English Soldier	378	36.15	127.18	4.92	71.68	1	3.66*a*
Ditto - in India	261	34.15	103.19	2.39	66.32	1	3.58*a*
English Sailor (Fresh Meat)	302	34.82	102.89	3.17	70.55	1	3.70*a*
Ditto - (Salt Meat)	290	40.83	132.20	6.03	87.40	1	3.94*a*
Dutch Soldier, in War	198	35.21	102.08	1.85	74.08	1	3.87*b*
Ditto - in Peace	383	24.52	106.80	4.15	70.77	1	5.32*b*
French Soldier	347	33.24	127.76	4.62	85.25	1	4.72*c*
Bavarian, ditto	242	21.08	102.10	3.32	62.45	1	5.47*c*
Hessian, ditto	423	23.0	136.0	...	77.0	1	6.16*d*
DIETARIES OF THE YOUNG.							
Christ's Hospital, Hertford	216	17.16	61.27	2.47	39.18	1	4.21*e*
Ditto - London	242	17.27	76.82	2.84	46.95	1	5.02*e*
Chelsea Hospital, Boys' School	245	12.89	93.28	5.93	57.67	1	8.29*e*
Greenwich Hospital, ditto	231	18.43	86.73	2.62	52.87	1	5.29*e*
DIETARIES OF THE AGED.							
Greenwich Pensioners	269	24.46	122.21	3.54	72.43	1	5.46*f*
Chelsea - ditto	332	29.95	112.64	4.65	78.03	1	4.80*f*
Gillespie Hospital, Edinburgh	156	21.02	92.32	2.35	71.39	1	6.26*f*
Trinity Hospital, - ditto	192	19.63	97.34	3.33	57.30	1	5.38*f*
OLD PAUPER DIETARIES.							
Class 1.	...	20.21	88.61	3.27	54.30	1	4.95*g*
„ 2.	...	14 96	89.59	2.89	51.10	1	6.31*g*
„ 3.	...	15.78	99.88	3.91	55.43	1	6.50*g*
„ 4.	...	19.22	116.84	3.96	67.87	1	6.50*g*
„ 5.	...	15.49	96.51	3.58	54.72	1	6.53*g*
„ 6.	...	14.67	88.03	2.84	49.57	1	6.25*g*
Average of all English Counties in 1851	...	22.0	99.0	...	58.0	1	4.85*h*
St. Cuthbert's, Edinburgh	175	14.80	89.37	3.31	46.98	1	5.85*i*
City Workhouse, ditto	107	13.30	49.99	1,74	31.48	1	4.36*i*
ENGLISH PRISON DIETARIES.							
Class 2. Males	206½	15.28	111.85	3.46	59.23	1	7.13*j*
„ 3. ditto	276	18.26	123.60	4.05	67.53	1	6.81*k*
„ 4, 8 & 9. ditto	229	20.97	159.98	5.03	69.88	1	6.13*l*
„ 5. ditto	326	20.29	130.57	4.23	73.31	1	6.65*m*
„ 6. & 7. ditto	271½	20.97	125.98	5.03	69.88	1	6.13*n*
BENGAL PRISON DIETARIES.							
Non-Labouring Convicts	224	18.43	163.16	2.08	76.35	1	7.62*o*
Working Convicts	296	28.16	191.12	2.97	91.07	1	5.96*o*
Contractors' insufficient Diet	167¼	12.70	135.95	1.30	61.33	1	8.88*o*
BOMBAY PRISON DIETARIES.							
All Classes of Prisoners not on Hard Labour	182	28.00	101.50	2.03	68.81	1	4.52*o*
Hard Labour	224	35.63	128.80	2.45	87.22	1	4.50*o*
ARCTIC AND OTHER DIETARIES.							
Esquimaux	...	250.0	1280.0	...	1125.0*p*	—	—
Yacut	...	999.0	640.0	...	966.0*p*	—	—
Bosjesman	...	574.0	368.0	...	555.0*p*	—	—
Hottentot	...	424.0	400.0	...	604.0*p*	—	—
Agricultural Labourer, England	168.6	26.64	106.57	1.10	74.70*q*	—	—
Ditto - - ditto	114.6	20,39	72.46	1.18	51.72*q*	—	—
Ditto - - India	218.0	14.02	138.27	2.41	61.54*r*	—	—

a Public Dietaries. *b* MULDER. *c* Special Return obtained.
d LEHMANN. *e* Special Returns obtained. *f* Special Returns obtained.
g The 6 dietaries recommended as equivalent by the Poor Law Commissioners.
h Specially reduced from all the Unions in 1851. *i* Special Returns.
j Convicted Prisoners exceeding 7 days, but not exceeding 21 days.
k Convicted Prisoners, Hard Labour, exceeding 21 days but not more than 6 weeks.
l Convicted Prisoners, Hard Labour, above 6 weeks and not more than 4 months.
m Convicted Prisoners, Hard Labour, for terms exceeding 4 months.
n Solitary Confinement.
o From information supplied from the India House.
p These probably represent Extreme cases, mentioned by the following authorities:—Ross, 1835, p. 448. Parry, 1823, p. 413. Cochrane, p. 255. Saritcheff. Barrow, pp. 152, 258. Richardson, *vide* Agric. Cyc. article *Diet*.
q Gloucestershire and Dorsetshire. See Agric. Cyclopædia.
r Dharwar, Bombay—Return in Bombay Prison Dietaries.

Home Correspondence.

FLAX, AND ITS PRODUCTS, IN IRELAND.

CONTRIBUTED BY WM. CHARLEY, SEYMOUR HILL, BELFAST.

LETTER IV.

In several of my previous communications, extracts of interesting matter, collected in the published reports of the Linen Board, have been freely made, and in this paper, which is devoted to the elucidation of Mr. Lee's "patent flax-preparing process," I think I cannot do better than allow your readers to have the description of the patent written by the inventor himself. This gentleman, though greatly unsuccessful, must have possessed a good deal of talent and ingenuity, as he converted to his views the intelligent gentlemen composing the Linen Board. For several years they paid very large sums for the patent machines, and offered premiums for cloth made from flax prepared in this new way; but all of no avail, thousands of pounds were lavished in vain on this "dazzling but illusory experiment."

The blazing beacon of radical reform burned brightly for a time, but soon subsided, and the gentler light of conservative progress happily occupied its place. In everything reforms, to be successful, must be gradual, and theories, however beautiful on paper, must stand the automatic test of practical experience before they can be crusted.

No doubt all improvements must have a moderate beginning, and I am aware of several trials, scientifically eonducted, that were not at first particularly flattering, ventually lead to great results. The truth was in the newly-discovered principle; but it required time for its clear development from the dark clouds of ignorance in which it was almost entirely concealed. Mr. Williamson's able letter, a copy of which I intend sending hereafter, with the resolutions of 34 of the leading merchants, agreed to at Belfast, will explain very clearly the main objections to Mr. Lee's system.

I have also been told by an old friend that the quantity of fibre Mr. Lee's expensive machinery turned out was so observably small in comparison with the cost and bulk of his utensils, that this defect in itself would have condemned the entire affair. While agreeing in this condemnation, all but universally pronounced on Mr. Lee's patent, I have carefully looked for some redeeming quality, the discovery of which might be some compensation for the time and money spent.

The only point pressed by Mr. Lee that to me appears of much value, is the use of SOAP in bleaching. I have no hesitation in saying that if saponaceous compounds were more applied in our bleaching process than they commonly are, the strength of the fibre would be greatly increased. After the many severe and caustic preparations the linen has to pass through, the soap has the effect, so to speak, of *balm*; it restores the essential oil extracted by the alkalies and acids, and keeps the fibre in a mellow and healthy state. I do not mean to say that Mr. Lee was the inventor of saponaceous applications in bleaching, but in his patent system he advocated their use, and it is therefore only fair to give him credit where he is evidently right. With these prefatory remarks I submit Mr. Lee's description of his own patent:—

"*Letter of Mr. James Lee, of Old Ford, in the County of Middlesex, Inventor of the New Process for preparing Flax and Hemp, to James Corry, Esq., Secretary to the Trustees of the Linen and Hemp Manufactures of Ireland.*

"I beg leave to lay before you, for the information of the trustees of the linen and hempen manufactures, the results of my observations during the two visits which I made to Ireland, in the course of the last year, for the purpose of introducing and establishing there the improved process for preparing and dressing flax and hemp."

After some further introductory observations Mr. Lee proceeds:—

"The subject divides itself into two parts; first, that which relates to the culture and treatment of the Flax; secondly, that which relates to my new Machinery, intended to prepare it for the manufacturer. I will, therefore, endeavour to confine my remarks, as far as it may be practicable, under the heads to which they respectively belong.

"THE FLAX.—The culture of the plant is so well understood in Ireland, that very little is necessary to be said in respect to it, and that little I have condensed into a paper attached to this report, in order to pass, without interruption, to other topics, about which public opinion seems to be less established. It has been contended, that the humidity of the climate of Ireland renders it unfavourable to the adoption of a process for preparing flax and hemp which purports to dispense with either water or dew-rotting. I am not of that opinion, and I am ready to be judged by a reference to the flax which the country produces. Suffer me to state what I saw. I found most of the flax plant which was managed according to the instructions of this process, well saved, both in colour and quality; its fitness to meet the machinery was proved by the facility with which it was brought into that state of softness and whiteness which was so much admired in the English flax prepared in a similar manner.

"The seed was in every respect fit for sowing or crushing. I refer you to the two small parcels of flax which I lately sent you as they came from the field. One, with the seed thrashed out, was taken from some grown by Sir Thomas Foster, near Dundalk; the other, with the seed on, was taken from what was grown by Mr. Curtis, near Lisburn; both of them are, like other parcels that I collected, fit for the finest purposes; all, to be sure, was not equally good, for some appeared sour and discoloured, which, I am disposed to believe, arose from having been sown too late, and from want of attention after the flax had been pulled. Flax of this description produces but little fibre, and what it gives is of inferior quality, and is not easily prepared by any process. I am rather confirmed in this opinion, by observing, that of the large quantities of flax grown in the neighbourhood of London, under my own inspection, whatever is sown *early* is uniformly superior, both in colour and quantity, to what is sown late, and I have observed that this difference has taken place in all places where the land has been equal in quality and condition. The same causes are found to produce the same effects in other parts of England, and in all other countries where flax is cultivated—but the spring frosts of Ireland are said to be inimical to early sowing.

"They are, it is said, 'fatal to a plant the native of a warm climate.' I am not well enough acquainted with the climate of Ireland to know the prevalence or severity of those frosts, but I have yet to learn why flax, which is found to grow in so many different climates, and to prosper principally in those that are cold, can be said to be the native of a warm one. In England it meets, without injury, the night frosts of March, and is considered a healthy plant in every country where it grows. The new process recommends, therefore, early sowing and early pulling; that is, at the periods and under the circumstances stated in the annexed paper. It requires, in short, like other processes, an attention to the directions given, and, with that attention, all the objects which it holds out to the country may, and must be, accomplished.

"The former practice of steeping the flax of Ireland, and the proposed means of avoiding it in future, naturally interest the Irish public. Opinions seem a little unsettled on the subject, in consequence of a letter from Mr. Robert Williamson, of the county of Antrim, dated the 1st of December, 1815. He states, first, 'That with respect to flax pulled green and fit for the manufacture of fine linens it cannot be cleaned and prepared by the new machinery, and that the steeping process is the best yet discovered for separating its woody parts from its fibre; and 2nd, that if the unsteeped flax of Ireland be found answerable for the manufacture of the coarser fabrics, it can be cleaned with greater facility by the old method.' Preferring, therefore, to persevere in conducting the linen manufacture of Ireland according to the old modes of steeping, spreading, drying, beetling, and scutching, with all their manifold objections, to the advantages available to the country from modern discovery. Mr. Williamson was one of those gentlemen of Ireland who did me the honour of supporting the new process on its introduction.

"His fullest approbation of it was expressed in a letter to your Board of the 7th of July last, and I was the more flattered by his opinion from the pains that he took to make himself acquainted with the subject before he pronounced it.' [This letter of Mr. Williamson's is too long to transcribe here; though cautiously worded, the expressions therein are rather in favour of Mr. Lee's invention.]

"Mr. Williamson, in a subsequent letter, addressed to your Board on the 1st of December last, to which I have already alluded, has taken a very different view of these subjects. I am far from presuming to contend against the fair principle of allowing to every man the right of changing his opinion, wherever research and experience may induce him to alter it; but it must be conceded, as equally true, that much of the weight of authority is forfeited to him, upon *either* side of a question, whose opinion is found to be recorded on *both*. I should be sorry, however, if Mr. Williamson were to consider me as failing in personal consideration for him, although I may feel it a duty to myself and to the country. upon a subject of so much interest to both, to animadvert with freedom upon those parts of his statement in which he materially differs from me and from himself. The gentlemen of the linen trade of Ireland are the only fair umpires between us; and to them I appeal. At a meeting held at the White Linen Hall, of Belfast, on Friday and Saturday the 5th and 6th of January last, which was attended by a number of the most respectable bleachers, dealers, and manufacturers of that county, the whole process was shown; and the sentiments of the meeting having been officially communicated to you by the Marquis of Downshire, I consider them suitable to me here, and, therefore, I have annexed a copy of them to this letter. Now, let us look to that part which relates to the subject before us.

"'We, the subscribers, conceive it but justice to those experiments which were made by Mr. Lee in our presence, from beginning to end, as well as to remove any prejudices which might have been adopted by persons who have no idea of the nature of the process, to state,—1st. That there is no necessity for water-rotting flax, to make it in any wise better, than, if properly pulled and safely stacked, it will be without so doing. 2nd. That by avoiding the process of water-rotting the seed is saved from our own flax, equal, as we saw this day, to any imported.'(a) The solubility of the colouring matter of unsteeped flax in water, or soap and water, and the facility of bringing it, after washing, to a pure and brilliant white, without the aid of any chemical agent, comes next into consideration. Mr. Williamson considers the solubility of the natural colour of the flax to belong in common to all flax, namely, that which has been either steeped or dew-rotted, as well as that which has been submitted to neither process. I hardly know what is meant by the colouring matter of flax that has been steeped or dew-rotted; its *natural* colour is obviously lost by the steeping, the strength of the fibre is reduced, and the flax itself has assumed the colour of the animal, or vegetable, or mineral qualities which impregnated the water in which it was immersed, imbibing with it a dye, from whatever quality prevailed, so much in the way of the bleacher, that he can only get rid of it, as Mr. Williamson once truly said, by the means of 'a tedious, difficult, and dangerous process.' To show, were it possible, the general solubility of the colouring matter of all flax prepared in every manner that is practised, Mr. Williamson has laid before you, as he states, the following samples:—No. 1. A sample of water-rotted flax, perfectly white, that was bleached in twenty-four hours with water, soap and water, and diluted oxymuriatic acid, without the intervention of alkali.' 'No. 2. A sample of dew-rotted flax, made white in the same time, and with the like materials.' 'No. 3. A sample of Irish flax, prepared after the manner of Mr. Lee, treated in the same way, and with similar success.' 'No. 4. A sample of flax imported from Pernan, apparently dew-rotted, treated in the same way, and with the same success.' And No. 5. 'A sample of hemp made white in the same time, and with the same success." I have seen these several samples; they are indeed made white, but they are of *a pale deadly colour*, differing from that pure and brilliant white which shows the wholesome condition of the fibre as well as its beauty. The staple of these specimens has been destroyed by the strength of the acids employed in whitening them, and I only wish they were of sufficient quantities to be offered to the test of manufacture. 'Oxygen (says Mr. Williamson) whether from the atmosphere, or from the direct application of the oxymuriatic acid, is necessary to the whitening of all flax.' I am not of that opinion; and I must appeal, from a position more strongly put than well considered, to the declaration of the gentlemen of the linen trade in his own neighbourhood, at the meeting to which I have referred. The whole of their proceedings is annexed; but their last resolution in speaking of the flax prepared after the new manner, thus expresses the opinion of those present:—'The said flax, after thus passing through the refining machine, and being washed in cold water, did, in a short space of time, part with all the impure matter it contained, or very nearly so; and it was rendered completely pure and very nearly white, by being boiled in soap and warm water about twenty minutes. All this was without any exposure to the atmosphere. None is *necessary* to the whitening of the flax, however *desirable* it may be at a favourable season of the year.' It will, perhaps, surprise you to hear that Mr. Williamson attended this meeting himself. He there saw a parcel of Irish flax taken in a yellow state, and put into a course of being made white: he left it for a while undergoing that operation, but in the care of persons whose veracity is known to him. He returned before it was finished, and witnessed its conclusion, whereby the flax was brought to a brilliant white in less than an hour from the time it was begun, by the simple means of soap and water only, and without any exposure to the atmosphere. But supposing, which I cannot admit, that the oxygen of the air is necessary to bleaching a good white, is it nothing to have removed the necessity of resorting to those caustic materials which have been hitherto used in the course of a process at once dilatory, dangerous, and expensive.

"THE MACHINERY.—It remains only now to report to you whatever fell under my observation connected with the mechanical part of the new process. The introduction of new machinery, into any country, has disadvantages to encounter from ignorance or prejudice, or both; but, much to the honour of Ireland, I will say, that, so far from finding any hostile disposition to a system that threatened a subversion of all the ancient habits of the people, in respect to the great staple manufacture of their country, I met everywhere a kind and encouraging reception; all professed to feel an equal interest with myself in the welfare of the new process; and all were desirous of understanding it. A complete set of machinery comprised four machines:—1. A Thrashing Machine; 2. A Breaking Machine; 3. A Cleansing Machine; 4. A Refining Machine. Objections were made to the machinery in many places where it was *not* understood, and the substance of them was these,—First, That it consumed too much time, and, therefore, cost too much labour; and, secondly, that it occasioned great waste. Experiments are stated to have been made by Mr. Williamson, with a view to ascertain the extent to which those objections were found to exist; and, therefore, it becomes necessary to advert to his report of the results. In the series of samples, he has sent you as he states, the following:—'No. 6. A sample of unbleached flax, prepared according to the new method, 32 ounces of which produced, on Mr. Lee's machinery, 3½ ounces of unrefined flax, with more than one hour's labour of one man.' 'No. 7. A sample of the same growth, prepared in the same way, without steeping, but cleaned at a flax-mill, produced 7 ounces, unhackled, with less than *five* minutes' labour.' 'No. 8. A sample of the same growth of flax, steeped or water-rotted, a like quantity of which, cleaned at a flax-mill, produced 7 ounces, unhackled, with less than five minutes' labour.'

Mr. Lee, after a long defence of his machines, next refers to his visits to different parts of the country, and concludes with a tribute of thanks to the Marquis of Downshire for the kind attention he at all times received from his lordship.(a)

Proceedings of Institutions.

CLAPHAM.—On Friday evening, Nov. 18th, Mr. Joseph Simpson, of the Islington Institution, delivered an interesting and instructive lecture before the members of the Literary Institution, on "The Times we Live in." Reverting to periods antecedent to the age of railroads, steam, electricity, gas, and other manifold necessities of the present day, the lecturer drew a picture of the manners and customs in the so-called "good old times," and forcibly contrasted the disadvantages under which our ancestors laboured, with the advantages enjoyed by the present generation. To the progressive spirit of the art of printing he justly attributed the great advances made during this century, and truly said that, through its me-

(a) This paper was signed by only ten gentlemen, and not all engaged in the linen trade.

(a) Errata in last letter, page 628, column 1, line 40, instead of Maghuafelt, &c., read "Magherafelt Moneymore, *Armagh*, &c., for low 7-8, 3-4, and 4-4 Linens." Same column, line 46, for "masses," read "*weavers*." And last word of the letter, read "*accord*," instead of "account."

dium, what would formerly have required ages to complete, was now effected in a single lifetime. The lecture afforded considerable satisfaction.

Durham.—On Friday evening last, the twenty-eighth anniversary meeting of the Mechanics' Institute was held in the reading room. The president, Mr. J. F. Elliot, occupied the chair, and opened the proceedings with a few remarks. The secretary, Mr. W. Hutchinson, then read the Report, from which it appeared that at present the number of members was 336, exclusive of life members. Of this number 163 are members of both the reading-room and library, whilst the remaining 173 are members of the library only. The income for the year ending September 30th, was £168 15s. 9d., and the expenditure £159 5s. The library has been increased by the addition of fifty volumes, and a large selection of parliamentary papers has just been received from Mr. W. Atherton, M.P.

Lymington.—On Tuesday week, Mr. John Haas delivered a lecture on "Fables," to the members and friends of the Literary Institution. The lecturer traced the origin of parables and fables from remote antiquity to the present period; and proved beyond a question that the truths thus circulated were calculated not only to amuse the young, but, as in the days of old, to afford lessons of caution and instruction to those of maturer years.

Reading.—Mr. J. Boorne, the Honorary Secretary to the Literary, Scientific and Mechanics' Institution, delivered a lecture "On the Poetry and Genius of Longfellow," to the members and friends of that Institution last week. After some introductory remarks on poets and poetry in general, Mr. Boorne said that he thought it would be no injustice to Dana, Emerson, Bryant, Whittier, and other noble sons of song in America, to style Longfellow *the* poet of that country. In his writings, richness of imagery, wideness of sympathy, a manly earnestness of purpose, with a mildness and felicity of expression, were the qualities which struck the most casual reader. He did not excel in the profound or sublime, in the majestic or philosophic; but in the beautiful, the feeling, the sympathetic, and the descriptive, he was scarcely to be equalled,—certainly not surpassed. He had done very much to supply a demand—which he had greatly assisted in creating—for a class of pure and pleasant poetry, such as was referred to, and at the same time illustrated by that piece of his "The day is done." A few years since, Longfellow spent much time on the continent of Europe, in pursuit of his profession: and Sweden, Holland, Germany, and Spain had supplied him with many subjects of verse, and he had translated much of the poetry of those countries. In his writings there were no idle tales, no song without a healthy sentiment, no piece without a lesson. These remarks were illustrated by "The Belfry of Bruges," "The Psalm of Life," "Footsteps of Angels," "The Village Blacksmith," &c., which were appropriately and effectively recited. "Evangeline" was next spoken of as the best and most artistic of Longfellow's compositions. It was written in the old Latin hexameter, a metre seldom attempted by modern writers, but in which Longfellow had been most happy. Longfellow was no literary thief; he never appropriated the words or ideas of others; we therefore the more readily pardoned the occasional repetition of his own. There was throughout Longfellow's writings a tinge of sorrow, if not of melancholy—a melancholy, however, which did not depress downward, towards death, but served only to stimulate to life and action. He did not cast a strong summer sunshine on our path, but shed a chequered autumnal ray. With him there were no unqualified pleasures. The lecturer recited many pieces during his discourse, concluding with those which might be described as heroic, as "Excelsior" and "The Light of Stars."

Romford.—On Tuesday evening a lecture on "The Manners, Customs, and Habits of European Turkey," was given by Mr. Percy St. John, in the hall of the Literary and Mechanics Institution.—The lecturer traced the history of this country through several ages, remarking upon the deeds of valour and heroism of its former inhabitants, and its present position; touching upon its form of Government, which he designated as a very bad one, he pointed out the abuses and corruption which were practised by every person in authority—from the Sultan down to the lowest officer of Government. He gave some amusing anecdotes of the low state of civilization, the education of the inhabitants, and their ill success in attempting to follow the other countries of Europe in the great march of progress, as also the wretched state of their army and navy. He depicted in forcible language, the low moral state of the people and the practice of infanticide, and the slavery carried on at Constantinople, which he believed to be worse than that of America.

Salisbury.—The lecture on "Nineveh," delivered on Wednesday last at the Literary Institution by the Hon. and Rev. S. Best, of Abbot's Ann, attracted a very large audience. The hon. and rev. lecturer contrived to compress within the limits of a single address a highly instructive and interesting epitome of the results of the valuable discoveries of Layard, Botta, and others; pointing out the antiquity and splendour of the buried cities, the power of the commercial states of which they were the capitals, the striking evidence they afford of the literal truth of many passages of Scripture, which sceptical philosophers had previously regarded as either mythical or allegorical; and deducing from the fall of Nineveh those lessons of warning and watchfulness which are so peculiarly applicable to a great commercial nation like England, which worships wealth like a deity, which lies midway in that stream of civilization and greatness which has uniformly flowed from the South-East towards the North-West, which has overflowed Assyria, Greece, Rome, the Netherlands, and Britain, and left all but the latter dry; and which is now setting full upon the shores of North America. At the conclusion of the lecture the Lord Bishop of Salisbury, patron of the Society, proposed a vote of thanks to the lecturer, and took the opportunity of expressing his own sympathy with the objects of the Institution, which, in its twofold aspect, afforded opportunities to its members for the enjoyment of the pleasures of taste and imagination, and for the cultivation of the best feelings of the heart, by familiarizing their minds with *literary* studies, while in the other department of it—the *scientific*—it might be brought to bear upon the material arts and manufactures of the country, and thus encourage studies which were as delightful to those who pursued them, as they were beneficial to the country at large. The Very Reverend the Dean seconded the vote of thanks, which was carried by acclamation. The foregoing lecture was illustrated by thirty diagrams belonging to the Hants and South Wilts Lecturers' Association, which already possesses a large collection, illustrative of the following subjects:—Nineveh, 30; Solar System, 23; Physiology, as regards Health, 10; Eastern Habitations, 10; Catacombs of Rome, 21; Paganism, 6; Nebulæ, 6; Optics, 6; Microscope, 6; Mechanics, 3; Missionary, 20; Australian, 10; Manufacture of Glass, 3; Ditto of Gas, 1; Smelting of Iron, 1; Phantasmagoria Lantern and Microscope—Natural History Sliders, 56; Botanical ditto, 14; Astronomical ditto (plain), 30; Ditto ditto (rackwork), 10.

Stirling.—Taking advantage of the Exhibition of Photographic Pictures, from the Society of Arts, London, Mr. Rae, the Secretary to the School of Arts, delivered a lecture on Wednesday week to the members and friends of this Institution "On Photography, or the Production of Pictures through the Agency of Light." The lecturer referred to the first researches made by Neipce, Daguerre, Fox Talbot, Wedgewood, and Sir Humphry Davy, and said that the whole art depended on a very simple fact or principle—the blackening action of light upon certain salts of silver. He familiarly explained the photographic printing-press—the production of negatives and positives—the fixing process—the various chemical

substances used, and the means employed for taking portraits and views from nature by the camera obscura. He proceeded to describe the various processes, such as the calotype on paper, the collodion on glass, the daguerreotype on silver plates, and the albumenised process, which was a substitute for the collodion on glass plates. Nature was herself the photographic painter; and although we had views innumerable of our ancient buildings and hoary-crested piles, yet no labour of man, however great his genius, could equal in faithfulness and delicacy of touch the graphic delineations of Nature's artist—the light of the sun, the crowning beauty of morning and the glory of the day. He considered that the art of photography was only in its infancy, and that it was impossible to conceive to what purposes it might not still be applied. He rapidly sketched the new system of photo-printing, the application of photography to astronomy, and to the value of this art as a means of collecting truthful examples of architectural details; and, in conclusion, exhibited the stereoscope, an instrument for illustrating binocular vision.

MEETINGS FOR THE ENSUING WEEK.

MON. Inst. of Actuaries, 7.
British Architects, 8.—Mr. C. Winston, "On the application of Painted Glass to Buildings in various styles of Architecture."
Geographical, 8½.—Lieut-Gen. A. Jochmus, communicated through Sir Roderick Murchison, "Journey into the Balkan, or Mount Haemus; with a description of the defiles through this celebrated mountain range, and a comparison of the routes pursued by Darius, Alexander the Great, and Marshel Diebitch."

TUES. Civil Engineers, 8.—Resumed discussion "On Ocean Steamers," and paper by Mr. J. Leslie, "On Inclined Planes for Canals."
Botanical, 8.—Anniversary.

WED. Society of Arts, 8.—Mr. A. Fraser, "On the Consumption of Smoke."
Geological, 8.—Messrs. W. R. and H. Binfield, "On the Occurrence of Fossil Insects in the Wealden Strata at Hastings, Sussex;" and Mr. D. Sharpe, "On the Age and Character of the gravels at Farringdon, Berks."
Royal, 8½.—Anniversary.

THURS. Zoological, 3.
Antiquaries, 8.
Photographic, 8.

SAT. Asiatic, 2.
Medical, 8.

Miscellanea.

NOVEL APPLICATION OF GLASS.—The Prussians have put glass to a novel use. A column, consisting entirely of glass, placed on a pedestal of Carrara marble, and surmounted by a statue of Peace, six feet high, by the celebrated sculptor Rauch, is about to be erected in the garden of the palace at Potsdam. The shaft will be ornamented with spiral lines of blue and white.

THE ROYAL OBSERVATORY at Brussels has just been placed in electric communication with the Royal Observatory, Greenwich, for the purpose of facilitating the determination in a direct manner of the difference of longitude between the two establishments. This operation is one of extreme delicacy, as well as of great importance to geodesy. The electric communication is made in such a manner that every oscillation of the pendulum at Brussels will be represented with accuracy at Greenwich, and *vice versa*. The observations are to commence this week.

PHOTOGRAPHY ON TEXTILE FABRICS.—Messrs. Wulff, of Paris, have placed before the French Institute some specimens of photography on linen, oil cloth, chintz, &c. This discovery will be of great importance for architectural ornamentation and other useful purposes. Such pictures can be cleaned by wiping, nay, they can be washed, and a portrait on linen or long-cloth can be forwarded in a letter. As, moreover, these photographs can be obtained at a cheaper rate than those on metal or paper, the art will become more popularized. Messrs. Wulff keep their procedure yet secret, but it is thought that they operate on a preparation of iodized collodion.—*Builder*,

FISHING STEAMER.—The Deep Sea Fishing Association are about to introduce a novelty—a fishing steamer: it has just been launched in the Clyde. The steamer can carry four fishing-boats to the fishing-ground, where they will be lowered into the sea, while fishing will also go on from the steamer. The machinery of the vessel is of a new kind—there are neither paddles nor screw; and the vessel can be stopped, turned, or backed, almost instantaneously, without stopping the machinery or letting steam off.

ANOTHER ARCTIC SEARCH.—It was unanimously agreed at the meeting of the members of the Geographical Society on Monday se'nnight, that the chairman, Sir Roderick Murchison, should solicit the Admiralty to send out another expedition to the Arctic regions, in the summer of 1854. The new Arctic expedition is intended to proceed in quite a contrary direction to any of those previously sent out from this country in search of Sir John Franklin and the officers and crews of the Erebus and Terror discovery ships, now upwards of eight years absent from England.

A NEW DISCOVERY.—The *Official Venice Gazette* states, in a special article, that the Olympic Academy of Vicenza, having carefully examined the discovery made by their fellow citizen Tremeschini (mentioned about six months ago) of electric telegraphy by *secret transmission*, has publicly declared it to be a most successful invention. The commission appointed to test its efficacy was composed of the Councillor-Delegate of the Podesta, the Superior Commissary, and the Academic Council. The first experiment consisted in sending and receiving a dispatch in the common way, without secrecy. In the second experiment, a dispatch was sent secretly, and the answer received in the same manner, by the aid of the new apparatus. In the third, a dispatch was sent openly, and the answer received secretly, to show that the secret apparatus might be used or suspended at will. The results of the inquiry show:—1st. That the apparatus of Tremeschini may be applied to Morse's telegraph. 2nd. That when the dispatch is sent secretly it can only be received so, any fraud in that respect being subject to immediate detection. 3rd. That secrecy may be suspended or applied at pleasure. The report of the commission is highly eulogistic of the invention.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

From Gazette, 18th November, 1853.

Dated 5th September, 1853.

2042. J. Clare, jun., Liverpool—Construction of iron houses, vessels, &c.

Dated 22nd October, 1853.

2443. J. F. Mermet, 23 Red Lion street, Holborn—Elastic spring in a tube, the lid of which moves down and up, according to pressure.

Dated 1st November, 1853.

2521. J. Crowley, Sheffield—Construction of ovens and furnaces.
2523. J. Hansor, Wandsworth road—Illuminating gas.
2525. A. Elliott, West Houghton, Lancashire—Looms.
2527. H. Tylor, Queen street, London—Chair bedstead.
2529. W. R. Palmer, New York—Spike threshing machines.
2531. J. Heywood, Ratcliffe bridge, Lancashire—Machines for printing yarns.
2533. R. Circhbutt, King's road, Chelsea—Woodcutting machines.

Dated 2nd November, 1853.

2535. F. A. Gatty, Accrington—Bath for heating and distilling.
2537. W. A. Gilbee, 4 South street, Finsbury—Levelling apparatus. (A communication.)
2539. W. Maltby, Cawborough—Preventing collisons on railways.
2541. F. Lipscombe, 233 Strand—Steam power, and regulating same.
2543. H. Brierley, Chorley, Lancashire—Spinning and knitting machinery.
2545. R. G. Hedges, Southampton row, Russell square—Fastening ends of India rubber springs.

Dated 3rd November, 1853.

2547. P. McGregor, Manchester—Spinning and doubling machinery.
2548. W. Wood, 126 Chancery lane—Abstracting and consuming smoke, &c.
2549. J. Moffatt, Birmingham—Candlesticks. (Partly a communication.)
2550. C. Reeves, jun. Birmingham—Swords, bayonets, &c.
2551. T. Irving, Ducton, Yorkshire—Preparation of wool for spinning.
2552. B. E. Duppa, Malenagner Hall, Kent—Colouring photographic pictures.
2553. W. Patterson, Edinburgh—Chairs.
2555. G. Duncan and J. Boyd, Liverpool, and J. Backy, Knotty Ash, near Liverpool—Cask manufacturers' machinery.
2556. E. Goddard, Ipswich—Gasburners.
2557. J. H. Tuck, Pall Mall—Motive power, and for raising liquids.

Dated 4th November, 1853.

2559. G. Nasmyth, of Brabant Court—Steam boiler furnaces.
2560. W. Hindman, Manchester—Steam boilers, and fixing same.

2561. W. G. Ginty, Manchester—Manufacturing of combustible gases from water, &c.
2562. W. Crosland, Hulme—Governing speed of engines.
2563. W. Racksterr, Royal Military Academy, Woolwich—Buffers.
2564. W. E. Newton, 66 Chancery lane—Machinery for crushing ores. (A communication.)
2565. H. H. Higginbottom, Ashby de la Zouch—Water closets.
2566. H. Pratt, Broughton street, Worcester—Kneading dough, clay, &c.
2567. W. Foster, Lister place, Bradford—Looms.
2568. J. H. Johnson, 47 Lincoln's inn fields—Malleable iron manufacture, &c. (A communication.)

Dated 5th November, 1853.

2569. J. Smith, Bradford—Millstones.
2571. J. Harrison, Crewe—Steam engines.
2572. J. Hyde, Sheffield—Furniture castors.
2573. C. Carr and W. K. Horsely, Seglich, Northumberland—Steam machinery and pumps for mines, &c.
2574. R. W. Jerrad, 17 Upper Eccleston place, Eccleston square—Steam boiler furnaces.
2575. J. Rubery, Birmingham—Open caps for sticks of umbrellas, &c.
2577. W. B. Johnson, Manchester—Steam engines, and pressure indicator.
2578. E. Kesterton, Long acre—Springs for carriages.

Dated 7th November, 1853.

2579. H. Pershouse, Birmingham—Deposition of metals.
2580. J. Todd, Fish street hill—Spindles and bearings for lathes, &c.
2581. M. L. J. C. V. Falconi, Paris, and 4 South street, Finsbury—Composition for preservation of the dead.
2583. J. Grindrod, Liverpool—Steam engines.
2584. H. Wiglesworth, Newbury—Coupling railway carriages.
2585. R. Roughton, Woolwich—Steam boilers, &c.
2586. T. Walker, Birmingham—Railway signal apparatus.
2587. A. V. Newton, 66 Chancery lane—Preventing fraudulent abstraction of property. (A communication.)

Dated 8th November, 1853.

2588. J. Onions and S. Bromhead, Peckham—Machinery for paper and papier maché.
2589. J. Gardiner and W. W. Wynne, Great Marlow, Buckinghamshire—Gas stoves.
2590. E. H. Graham, Maine—Firearms.
2591. H. Chamberlain, Kempsey, near Worcester—Brick tubes and tiles.
2592. G. F. Parratt, 27 Victoria street, Pimlico—Life rafts.
2593. E. L. Hayward, 196 Blackfriars road—Rozer of door and other locks.
2594. J. H. Johnson, 47 Lincoln's inn fields—Machinery for preparing and combing wool, &c. (A communication.)

Dated 9th November, 1853.

2596. B. Dangerfield, and B. Dangerfield, Jun., West Bromwich—Steam boilers.
2597. T. Dunn, Windon Bridge Iron Works, Pendleton; J. Bowman, Plaistow, Essex; and J. Dunn, Bellevue terrace, Pendleton—Machinery for raising, &c., heavy bodies.
2598. J. A. Driew, Patricroft—Cutting velveteens, &c. &c., to produce piled surfaces.
2599. J. Brown, Darlington—Coke ovens.
2600. W. Dicks, Floore, Northampton—Wheels for carriages.

WEEKLY LIST OF PATENTS SEALED.

Sealed November 16th, 1853.

658. John Talbot Ashenhurst, of Upper John street—Improvement in pianofortes.
1206. Jean Jacques Joseph Janin, of Gerrard street, and Alexander Seymour, of the Strand—Certain improvements in the manufacture of boots and shoes.
1733. George Spencer, of Manor road, Walworth—Improvements in springs for carriages.
1780. George Katz Douglas, of Chester—Certain improvements in the permanent way of railways.
1870. Richard Farmer Brand, of South terrace, Willow walk, Bermondsey—Certain improvements in firearms and ordnance.
1897. John Perkins, of Manchester—Improvements in the manufacture of oils.
1920. Alfred Vincent Newton, of Chancery lane—Improvements in the distillation and purification of resin oil. (A communication.)
2016. Astley Aston Price, of Margate—Improvements in treating wash-waters containing soap, oils, saponified or saponifiable materials, and in obtaining products therefrom.
2023. Henry Jeremiah Iliffe, and James Newman, both of Birmingham—Improvements in the manufacture of buttons.
2070. William Hall, of the Colliery, Castlecomer—Improvements in the conversion of peat into charcoal.
2121. William Smith, of Little Woolstone, Bucks—Improvements in implements for tilling and preparing land for crops.
2136. George Spencer, of Cannon street, west—Improvements in supporting rails of railways.
2149. Sydney Smith, of Hyson Green Works, near Nottingham.—Improvements in governors for steam engines.
2203. Hiram Tucker, of Massachusetts, U.S.—Improvements in the art or process of applying colours to a surface by means of a liquid.
2205. William Farmer, of Fulham Brewery—Improvements in apparatus for preserving provisions.

Sealed November 17th, 1853.

1215. John Lee Stevens, of King William street, City—Improvements in grates and stoves.
1217. James Thomas George Vizetelly, of Peterborough court, and Henry Richard Vizetelly, of Gough square—Improvements in printing machines. (A communication.)

Sealed November 18th, 1853.

1222. John Haskett, of Wigmore street.—Improvements in anchors, to be called the "Ferdinand Martin Safety Anchor." (A communication.)
1224. Wharton Rye, of Collyhurst, near Manchester — Certain improvements in kitchen ranges or fire grates.
1227. John Ryan, of Liverpool street—An apparatus for purifying liquids in a ready and economical manner
1231. George Sant, of Norton Lodge, Mumbles, Swansea—Improvements in clocks or timekeepers.
1327. John Macdonald, of Henry street, Upper Kennington lane—Improvements in and applicable to lamps; also applicable to apparatus for lighthouse signal purposes; part of the invention applicable to other useful purposes.
1601. John Fell, of Chorlton upon Medlock—Improvements in the treatment of certain oils.
1864. William Edward Newton, of Chancery lane—Improved preparation or composition to be applied to pigments, for the purpose of facilitating the drying of the same. (A communication.)
2064. James Gascoigne Lynde, jun., of Great George street—A pressure governor or self-acting apparatus for regulating the flow of water.
2124. Richard Laming, of Millwall, Poplar—Improved process for purifying gas.
2150. John Barsham, of Kingston upon Thames—Improvements in the manufacture of bricks, tiles, and blocks.
2186. George Peabody, of Warnford Court—Improved machinery for dressing and warping yarns. (A communication.)

Sealed November 19th, 1853.

1239. William Edward Newton, of Chancery lane—Improved machinery or apparatus applicable for pumping water, and supplying steam boilers with water, and maintaining the water therein at a proper level. (A communication.)
1244. William Fulton, of Paisley—Improvement in the treatment, and scouring or cleansing of textile fabrics.
1246. St. Thomas Baker, of King's road, Chelsea—Improvements in revolving shutters.
1251. Auguste Edouard Loradoux Bellford, of Castle street, Holborn—Improvements in rotary engines, to be driven by steam or any vapour, fluid, or gas; and in boilers or generators to be used in generating steam or gas for driving the aforesaid or other engines, or for other purposes. (A communication.)
1252. Thomas Isaac Dimsdale, of Kingstown, near Dublin—Improvements in purifying coal gas, and in disinfecting sewage or other fetid matters, and in absorbing noxious gaseous exhalations.
1251. William Carr Thornton, of Cleckheaton—Improved machinery for making wire cards.

Sealed November 21st, 1853.

1260. Henri Joseph Scouttin, of Naets, France—Improved plastic compound, applicable to various ornamental and useful purposes.
1262. Auguste Edouard Loradoux Bellford, of Castle street, Holborn—Improvements in navigable vessels, to be employed in all waters, and to be propelled or impelled by sails, steam power, or other means. (A communication.)
1289. Thomas Singleton, of Over Darwent—Improvements in looms.
1945. John Webster Cochran, of Gower street—Improvements in machinery for crushing, grinding, and pulverizing stone, quartz, or other substances.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Nov. 16	3530	Improved Paletot or Coat	H. J. & D. Nicoll	Regent street and Cornhill.
„ 18	3531	Sugar Mould or Sugar Funnel	Edward Morris	Birmingham.
„ „	3532	A Table Bedstead	Charles Symons	1 Prince's street, Fitzroy square
„ 22	3533	Candlestick	Albert Robert Cunningham	Kensington
„ 23	3534	Improved Flexible Tube Self-acting Level	George Brewer and Charles Suffell	10 Paradise place, Hackney; 138 Long Acre

Journal of the Society of Arts.

FRIDAY, DECEMBER 2, 1853.

THIRD ORDINARY MEETING.

WEDNESDAY, NOVEMBER 30, 1853.

THE Third Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 30th ultimo, WILLIAM BIRD, Esq., in the Chair.

The following candidates were balloted for and duly elected:—

Allan, Thomas
Aston, William
Barrett, Richard
Blews, W. H. M.
Boulton, George
Brown, William
Canning, The Right Hon. Viscount
Coe, John
Cottam, Edward
Cunningham, Henry Dundas Preston, R.N.
Dargan, William
Dawson, John
Drummond, Henry, M.P.
Elliott, George Augustus
Fergus, John, M.P.
Fife, The Earl of
Foley, John Hodgetts Hodgetts, M.P.
Fox, Wm. Johnson, M.P.
Goode, William James
Green, Stephen
Grosvenor, Lord Robt., M.P.
Harrowby, The Right Hon. the Earl of
Hervey, Rev. Lord Arthur
Hills, Rev. George, M.A.
Hooper, John, M.D.
Hutchinson, Rev. Jas. M.A.
Jackson, Ralph Ward
James, Jabez
Knight, Valentine
Lee, Philip B.
MacAlpine, William
Marcoartu, Arturo de
McCormick, William
Merchant, Thomas
Moseley, Rev. Henry, M.A.
Murray, Andrew
Newcastle, His Grace the Duke of
Norris, John Pilkington
Peel, Sir Robert, Bart., M.P.
Pollock, Henry
Rae, William Fraser
Reid, Hugo
Robinson, Frederick
Smith, William Henry
Standring, Benjamin, Jun.
Stanley, Lord, M.P.
Stansbury, Charles Fred.
Topham, James Tell
Towneley, Charles, M.P.
Travers, John Ingram
Wallenn, William Henry
Wallis, Thomas Henry
Wells, William, M.P.
Westminster, The Most Noble the Marquis of
White, John
White, John Francis
Wilson, John Robert
Winstone, Benjamin
Wovendon, Joseph
Zetland, The Earl of

Also the following as Honorary Corresponding Members:—

Fresenius, Professor, of Wiesbaden
Kasteele, M. Van de, of the Hague

The following Institutions have been taken into Union since the last announcement:—

310. Galway, Royal Institution.
311. Hexham, Mechanics' Literary and Scientific Institution.
312. Spalding, Mechanics' Institute.

Previous to the reading of the paper, the Secretary drew attention to some large and magnificent Photographs, which had been received from the Imperial Printing Office, at Vienna, and which, though unequalled in superfices by any British specimens, had been produced by an English lens, made by Ross. Also to a garment or cloak, manufactured from New Zealand flax, prepared in the native manner, which had been sent for exhibition by Mr. W. Stones, who, in a communication to the Secretary, said, that "it should be remembered that this fibre is obtained from the leaf of the plant, and not from the stem, as in the case of ordinary flax. The leaf is from 4 to 7 inches in length, and from 3 to 5 inches broad; it grows in clumps, from a depressed stem, something like an iris. The leaf is very parenchymatous or fleshy, provision for the removal of which must be made in any machinery intended for the preparation of the fibre. The native mode is to scrape the leaves with a cockle shell, thus tediously separating the fleshy portion from the fibrous; and the peculiarity of this successful but laborious process should not be overlooked. It is stated that, on trial, the strength of this material was found to be much superior to many others in common use, as the following proportions will show:—Silk, 34; New Zealand Flax, 23 4-5ths.; Hemp, 16 1-3rd.; Flax, 11 3-4ths.; Pita Flax, 7." Specimens of Chinese muscles, containing the Artificial Pearls alluded to in a previous number (*Vide* Vol. 1, p. 587), were likewise shown. The Paper read was:—

ON THE CONSUMPTION OF SMOKE,

BY ALEXANDER FRASER.

In presenting a paper on "Smoke Combustion," it is unnecessary to premise that, under the prospective alteration of the law with regard to furnaces, the subject, interesting as it is to the public generally, must be particularly so to the Society of Arts, Manufactures, and Commerce. It is not intended to enter upon the various theories which have been advanced upon the subject, or to discuss the many inventions before the public, still less to bring forward any new theory, but to give the "results of absolute work," in a successful attempt to remove the smoke nuisance from an extensive London brewery and its neighbourhood. Messrs. Truman, Hanbury, Buxton, and Co. have for many years been desirous of removing the nuisance from their densely-populated neighbourhood, and for this purpose had tried most of the plans which previous to 1847 gave reasonable hopes of success. It is unnecessary to allude to the various plans which have been tried, though it may be excused if the writer refers to a partially successful attempt of his own. The boiler (a spherical one, without a tube) was set in the ordinary way, until the return side-flue reached the fire-bars, when it was made to descend, and was connected with a cast-iron box, placed on a level with the furnace. This was repeated on the opposite side of the fire. The boxes being highly heated by the action of the fire, caused a rapid combustion of the smoke passing through them; but unfortunately, the consumption of the smoke caused the destruction of the smoke-consumer—the box was destroyed by the heat inside as well as outside. Fire tiles were afterwards substituted, but shared the same fate.

A general remark may here be made respecting many of the plans tried at the brewery,

which has been found to agree with the experience of others who have given attention to the subject; that any plan requiring additional attention on the part of the stoker—such as the opening or closing of air-valves— or giving him extra labour, which was required in some cases, was found in practice to be unsuccessful, although a single experiment, carefully conducted, might seem to prove the contrary.

In 1847 the writer's attention was first drawn to Jucke's Patent Furnace, which consists of a strong cast-iron frame of the full width of the furnace, and about three feet longer. The fire-bars are all connected together, forming, when complete, an endless chain, and are made to revolve round a drum, placed at each end of the frame. The front of the frame is provided with a hopper, in which the fuel is placed, and a furnace-door, which opens vertically with a worm and pinion. The height to which this door is raised by the stoker, regulates the supply of coal, which is carried into the fire by the gradual motion of the bars. The whole machine is placed upon wheels, to facilitate its removal for repairs to the boiler, brickwork, or furnace. The speed of the furnace-bars is determined by the draught. It varies from one inch and a half to three inches per minute, the object being to keep the whole of the bars covered with fuel, with a small accumulation of fire at the bridge. The bridge is suspended by a pipe three inches or four inches in diameter, fixed about one inch above the level of the bars; this allows the clinkers formed to fall into the ash-pit, but will not allow the fire to pass. A small stream of water must be supplied to the pipe or stop, or it would soon be destroyed. All the air admitted to the fire to support combustion, is made to pass through the furnace-bars. The consent of Messrs. Truman, Hanbury, Buxton, and Co., was obtained to the application of this plan to one of their engine-boilers—a cylindrical boiler, with two tubes—driving a forty-horse engine. It is due to them to state that the costly experiment was not made from any motives of economy in the first instance. Its success led to its application to a second boiler of the same form. In the same year the probability of its success under a brewing copper was discussed. There was no doubt, from the former experiments, as to its capabilities for raising steam or for evaporation; but with a brewing copper provision had to be made for a process in the manufacture almost peculiar to it. The contents of the copper have to be turned out several times in the course of a brewing, rendering it necessary to "bank up" the fire thoroughly, to protect the bottom of the copper, until refilled with wort or water. It was feared that the machinery would interfere with this being done effectually: it was tried, and with the same success as with the steam boilers. It was found that a fire of fifty feet or sixty feet area, could be worked for any number of hours, without the slightest appearance of smoke from the chimney-shaft; but the process of "banking up," before referred to, required the whole principle of the machine to be put in abeyance, during which time smoke escapes from the shaft, sometimes in large quantities, and no plan has been discovered for its prevention. Considerable difficulties were encountered in the application of the principle to the furnace last-mentioned. Owing to no provision having been made for its great size, the side frames and the driving-gear were too weak, and the machine generally was imperfectly put together. The stop carrying the bridge gave a great deal of trouble. All these difficulties were, however, removed by experience; the frame was strengthened, the furnace was re-made with greater exactness, and an important alteration was made in the driving-gear, which was removed from the side of the furnace, attached to a small crab-frame, and connected to the former by a small intermediate shaft. The "banking up" was found to be as effective as with the old bars. The remainder of the coppers and boilers were afterwards altered, as shown in the following table :—

	Date When fixed.	Cost.	Area in Superficial Feet.	Area of old Furnace.	REMARKS.
		£			
1st Engine boiler . .	Feb., 1848	160	17	27	Cylindrical boiler, with 2 tubes, fired underneath.
2d - ditto . . .	July, ,,	155	20	27	Ditto - ditto - - ditto.
1st Brewing copper .	July, ,,	292	49	61	380 Barrel copper. Contents of pan, 300 barrels.
2d - ditto . . .	May, 1849	252	24	29	200 ditto - - ditto 100 ,,
3d - ditto . . .	July, ,,	332	48	63	500 ditto - - ditto 300 ,,
4th - ditto . . .	Nov., ,,	332	48	63	500 ditto - - ditto 300 ,,
5th - ditto . . .	Feb., 1852	320	48	...	500 ditto - - ditto 300 ,,
6th - ditto . . .	... ...	180	30	39	300 ditto without pan.
12 Horse-power boiler	July, 1849	11	8	...	Bought at a sale.
Cooperage boiler . .	April, ,,	201	8	...	Cylindrical boiler, 8ft. 4in. diameter.
Ditto	Oct., 1848		13	...	25 Horse waggon boiler, without tube.
Ditto	Jan., 1850	97	14	...	Waggon boiler, with tube.
Ditto	... ...	105	10	...	Cylindrical boiler, without tube.
12 Horse-power boiler	Nov., 1852	100	...	...	Ditto - with tube.
Cooperage boiler . .	Fixing . .	...	...	...	Waggon boiler.
0 Horse-power boiler	Fixing . .	...	...	...	Tubular boiler—furnace to be fixed in fire-box.

The total cost of the fourteen furnaces, including brick-work, has been about 3,000*l*. The consumption of coals in the establishment is about 6,000 tons per annum. The saving in the coal account, since the introduction of the patent furnaces to July 1st of the present year, has been as follows:—

July 1, 1848,	£69	4	0
„ 1849,	631	4	0
„ 1850,	1606	0	0
„ 1851,	1925	12	0
„ 1852,	1906	0	0
„ 1853,	2200	0	0
	£8338	0	0

From which is to be deducted for casualties, which have been referred to, and sundries, say 350*l*. The above economy has not arisen from less weight of fuel consumed, but owing to the screenings or dust of coal only being required for the furnaces. Should the difference of price between large and small coals be reduced, the economy will be less in future years. There is a considerable loss in weight in using the dust of coal, but the following extract from a report by Messrs. Easton and Amos, who have made some interesting experiments with one of these furnaces, shows a saving of 11 per cent. in weight of fuel, when the ordinary steam coals are used. They say "the boiler with which the experiment was made is of a cylindrical form, with spherical ends (without tubes); its length is 20 feet; diameter 4 feet; and when used with the common furnace, the rate of evaporation was 7.73 lbs. of water by the consumption of 1lb. of Ord's Redhugh coals. We began to make experiments to ascertain the exact degree of saving effected by the patent furnace on the 12th of September, and continued them throughout the week, the engine working 62 hours. During this time we evaporated 47,520lbs. of water by the consumption of 5,488lbs. of Ord's Redhugh coals; the cost of which was 17s. 6d. at the furnace mouth. The evaporating power in this case is equal to 8.65 lbs. of water with 1lb. of coal, being a saving in fuel of nearly 11 per cent."

It will be noticed in the Table of Furnaces erected at the brewery, that a considerable reduction has been made in the area of all the new furnaces, varying from 20 to 30 per cent. with an increase of water or wort evaporated of 15 per cent. in one of the large brewing coppers. This arises from the fire-door not requiring to be opened, and from the movement of the bars which prevents any scoriæ stopping up the air spaces of the fire. It will be evident that this plan, which has been successful on land, would require some modification to make it equally so on the water. M. Tailfer, of Paris, in 1845, gave his attention to the subject, and the French government placed a steamboat at his disposal for the experiment.

It would appear at first sight that the wear and tear of a machine, apparently so complicated, must exceed the expense of the common fixed bars. This, however, has not been found to be the case, and it need not be so if ordinary care is given to the machine, and a periodical examination is made, such as any other machine of equal value and producing equally important results would receive. Within the last week a set of bars have been renewed, for the first time, which have been in use since May, 1849; and three fourths of the old bars are being again used for another furnace, where the boiler is of less importance than the one from which they have been removed.(a)

In conclusion, it must not be understood that the writer considers this the only plan for the combustion or prevention of smoke, for he has reason to believe that the eminent firm of Messrs. Price and Co. have been equally successful with other plans as well as with the one to which he has drawn attention; but he has confined his remarks to his own immediate practice, leaving inventors and others to give the result of their own experience.

(a) During the four and a half years, about 18 tons of fixed bars would have been used, which at £8 or £9 per ton, would have a considerable margin for repairs. It should be stated, at the same time, that there are facilities for repairs at Messrs. Truman's which many others have not, workmen being always on the premises ready to execute them.

DISCUSSION.

Mr. John Lee Stevens said, he could not venture to open the discussion, without bearing the strongest testimony to the ability and integrity of purpose which had been shown by Mr. Fraser. All inventors of smoke-consuming apparatus were indebted to Mr. Jucke as a great pioneer in their cause, and if such constructive genius had not been exhibited by him, the public might have waited a long time before the smoke nuisance would have been abated by legislative enactments. But not only was the inventor to be thanked, but thanks were also due to Messrs. Truman, Hanbury, and Co., for the manner in which they had disabused the public mind of the impression that the smoke from furnaces could not be prevented. He (Mr. Stevens) was himself an inventor of a means of consuming smoke, but he would not allude to the circumstance further than to state, that, judging from the pressure of work on his hand, there was ample room for twenty inventors. If he understood the matter at all, he thought the vocation of inventors was not to find fault with each other, but to sustain each other. Besides the invention of Mr. Jucke's, there was one equally clever by Mr. Samuel Hall. The machines invented by both of those gentlemen were moveable machines, but if a more simple and less expensive and pretending apparatus were required, he would be happy to exhibit his; and if it was not approved of, there were many others in the field from which a selection could be made. He thought they ought to put the public in the best position to judge for themselves. In reference to the invention which had been brought forward on this occasion, he contended that it had not been shown that it was anything but a slow combusting apparatus. It had not been shown that it was equally applicable to all purposes, for getting up steam to a higher power than usual, or for any other exigency. It had been stated that the saving in fuel by the substitution of slack coal was considerable, but he (Mr. Stevens) had been disappointed that the saving in the consumption of coal that actually took place, was not greater than had been stated. He expected Mr. Fraser to have said, that the saving in fuel would have approximated 20 per cent. Mr. Fraser had also said, that the highest evaporative capacity was 8.6lb. of water to 1lb. of coals. This was the only good test for ascertaining the capability of a furnace. With respect to his own invention, he had applied to the eminent firm of Messrs. Easton and Amos, seven or eight months ago, to induce them to take it up, but they said they preferred a moveable to a fixed apparatus, and that they had no faith in his invention. Notwithstanding this he was happy to say that one of his furnaces was now burning on their premises, side by side with that of Mr. Jucke, and that the comparison was not unfavourable to the less complex and less costly machine.

Mr. Tomlinson suggested that a definition of smoke was wanted. The expressions "consumption of smoke," and "prevention of smoke," were not very accurate, for, wherever there was combustion, there must also be products of combustion, and the visible portion thereof, or that which was commonly called smoke, was only one, and not the most noxious of those products. Smoke consisted of nitrogen, carbonic acid, carbonic oxide, sulphuretted and carburetted hydrogen, hydro-carbons, vapour of water, and some other matters. The black visible portion was, chiefly, the carbon from the carburetted hydrogen which was decomposed by the heat, but, owing to a deficiency of oxygen, did not undergo combustion, but was poured into the chimney, and so into the air in black, cloudy masses. The problem was to convert this visible

carbon into invisible carbonic acid; and, having done this, to trust to the diffusive powers of the atmosphere for getting rid of it. So long ago as 1785, Watt indicated the true principle on which this carbon was to be got rid of, and the smoke rendered invisible. His patent of that date was for constructing furnaces in such a way as "to cause the smoke or flame of the fresh fuel in its way to the flue or chimney, to pass, together with a current of fresh air, through, over, or among the fuel which had already ceased to smoke, or which was converted into coke, charcoal, or cinders, and which was intensely hot; by which means the smoke and grosser parts of the flame, by coming into close contact with, or by being brought near unto, the said intensely hot fuel, and by being mixed with the current of fresh or unburned air, were consumed or converted into heat, or into pure flame, free from smoke."

Mr. ECKSTEIN called attention to the valuable invention of Mr. Cutler, forty years ago, to consume the smoke in private houses. Mr. Cutler, however, had been unable to get a patent, as it was absurdly argued in a court of law that his invention was "not novel." About fifteen years ago Mr. Jucke thought he had discovered a machine applicable to private dwellings, but on showing it to him, he told him that he was twenty or thirty years too late, because Mr. Cutler had long since carried out the same idea. Mr. Juckes, however, like a clever, persevering workman as he is, went on, and ultimately produced the present ingenious machine. A friend of his had two of Mr. Jucke's machines at work, and he found that he saved forty per cent. in the price of his coals by burning small coals, and that of these he was enabled to use fifty per cent. less.

Mr. G. F. WILSON said, that as Mr. Fraser had referred to a visit that he paid yesterday to the works of Price's Patent Candle Company, where he saw a large number of smoke-consumers in successful operation, he, as a Director of these works, might perhaps be allowed to say a few words on the subject. A fortnight back, on being applied to by the Secretary to the Society of Arts, he had noted down some of the results of their experience of three different smoke consumers. When the letter was printed in the Society's Journal, their people at Vauxhall said it was correct except as to the number of smoke-consumers, which was twenty-one instead of nineteen. The letter should have expressed that all these smoke-consumers were under steam boilers. They had one sort of smoke-consumer or other under many kinds of boilers, marine, waggon, Cornish, and cylindrical, with two tubes and the fire underneath, but still they were under steam boilers only. Of brewers' coppers he knew very little, and had never seen the bottom of one; but, from what he heard the other day, in conversation with one of the largest brewers, he should suppose that they had difficulties to contend with that we knew nothing of, especially in the necessarily great size of their furnaces. It had been said that the chimnies at Price's Works sometimes smoked. They certainly did a little, and for a short time, but the fault did not rest with the smoke-consumers. At the Battersea Works they had many other furnaces connected to the same shafts. As the smoke consumers on some of these were for purposes requiring an intense dead heat, they burned pure anthracite, or even coke, and never smoked, except when a little bituminous coal got mixed with it by accident. The others, for purposes requiring not much heat, burned Merthyr, or free-burning Welsh coal, which, if stirred, gave off a little smoke. The smoke-consumers could not be substituted to do the work of either of these, as they gave a great, quick heat, which, as he had stated, was not applicable to the particular work. At Belmont Works they had nothing but smoke-consumers, and very rarely made any smoke; never, indeed, except when burning waste cotton or wood, which required stirring up in the coals to make them burn; or, as was stated in his letter, when, from any cause, the work employing steam had been stopped, the fires had to be made up on its being resumed. Any one who had taken the trouble to read the letter through, must have found this difficulty staring him in the face,—why, if this statement was correct, were not these furnaces in more general use. He would try to show reasons for this, in addition to those stated in the letter. Inventors (and being an inventor himself, and knowing the class well, he had a right to speak) were a most troublesome class to deal with; and the smoke consumers, with whom they had had dealings, deserved in this respect, to rank as highest of their class. Besides, the earlier-made furnaces were very imperfect. Jucke's bars were not deep enough, and therefore soon burnt through to the pins that connected them to the furnace sides; and these sides were too slight, the strength being put in the wrong place. Jucke's apparatus looked so pretty that they took it for granted that all its parts had been properly considered and calculated. It was not until two sides had broken down in the same place that they looked into the matter, and added strength to the weak part. The sides and bars as at present made, were, of course, very greatly improved, and the furnaces were now quite successful. Mr. Hall, to the furnace he put up for them, added what he called a "boiler protector." This was so highly effective, that it not only prevented the boiler from burning, but prevented the fire likewise; the "protector" was soon removed, and a brick arch put in its place; the furnace then acted perfectly, and continued to do so to the present time. Hazeldine was equally judicious, but in a different way. He first put up his furnaces to work right, altered them to improve them, and so made them work wrong. The last furnace he made for them, however, he having profited by his experience, worked admirably, and never got out of order. In some cases want of capital, and in all cases want of business experience and judgment in the inventors, had, he thought, been the principal cause of the slow progress of smoke consumers; but there was another cause at work. The manufacturers who put up the first of the patent furnaces had a direct interest in holding their tongues, or, what they called in Scotland "keeping a calm sough." The London small coals were at this time sold at about 4s. a ton cheaper than they would have been had furnaces well adapted for burning them been more generally used; at Vauxhall especially, acting for many others as well as themselves, they had no right to make a stir, or to do more than give such reports of the furnaces as the inventors had a claim to ask for. This year, however, circumstances had changed; on account of some small coal-consuming furnaces being at work, and from other causes, London small coals had risen to even above their real value. It seemed, therefore, that we must look in future to the north for our supply, and that the coming into general use of the smoke-consuming small-coal burning furnaces, as they would cause a larger demand, would make the supply more steady, and reduce rather than raise the price of small coal. He need not say what pleasure it gave him to have a hit, however humble a one, at what was in some towns at least an utterly intolerable nuisance.

Mr. VARLEY suggested that it was desirable that any gentlemen present who had constructed smoke-consuming machines, should explain their principle to the meeting in a practical manner.

Professor BRANDE said, that in his opinion we were deeply indebted to Lord Palmerston, for having successfully undertaken the mitigation of the smoke nuisance in London, and to Messrs. Truman, Hanbury, and Co., who had taken such decided steps for practically carrying out the subject in their large establishment. We had often heard it stated, apparently upon high authority, that the business of a brewery could not be carried on without the production of a large quantity of smoke; and that, although it might be possible to apply smoke-preventers to the engine-furnaces, they never could be brought effectually to bear upon the brewing-coppers. Mr. Fraser, in the very clear statement with which he had favoured

the Society, had shown that this was a mistake; and with due care and trouble the gigantic issues of black smoke from breweries, with which we were but too familiar, might not only be greatly diminished, but almost entirely got rid of; and, what was the most important of all, that this might be effected at a very considerable saving in the article of coals—a saving so large as to cover the cost of the very expensive machinery constituting the smoke-consuming apparatus which they had adopted. Dr. Brande then said, that the office which he held in the Mint had enabled him to acquire considerable information and experience upon the subject, and that for the last eight or ten years a variety of schemes for the prevention of smoke had been more or less successfully adopted in that establishment, not so much on account of the neighbourhood, which abounded in smoke-generating factories of one kind or other, but with a view to decrease the annoyances to those who resided in the building. He was glad that the subject would now be forced upon all smoke-producers, and was certain that the various inventions already extant for diminishing or preventing smoke, would consequently be improved and perfected, and that many new ones would gradually be brought forward, not applicable to very large establishments only, but to the minor nuisances of kitchen chimnies, and of the smoke arising from dwelling-houses generally—though to effect this end, a quantity of prejudice and obstinacy had to be encountered, which at present seemed almost insurmountable. Mr. Brande said that, in discussing the smoke question, it was not necessary to go into the theory of combustion, or to define what *smoke* is or is not. The dense black clouds of carbonaceous matter, in a state of extreme division, constituted the nuisance to be got rid of, and he who could effect this in the most ready manner, to the greatest extent, and upon the most reasonable terms, would be the most successful inventor. As far as the present discussion was concerned, Dr. Brande said that he should limit himself to Jucke's furnace, as that was the only one which had been described to the meeting, and that in regard to it he should have but little to say, inasmuch as his experience and opinion entirely coincided with that of Mr. Fraser. Several obstacles had, in the first instance, occurred at the Mint, in regard to the successful working of the revolving chain of bars, and also in respect to the feeding of the fire, the bridge, the brickwork, and so forth; but these difficulties had been gradually got over, and after using two of these furnaces successfully for five years, Dr. Brande obtained permission of the Master of the Mint to apply the invention to two twenty-horse power engine boilers, which had lately been done; in these new machines, the faults of those originally constructed had been amended; and they appeared to act very satisfactorily. These four furnaces are connected with one shaft about 100 feet high, and, except when the fires are lighting, no visible smoke escapes. But the greatest smoke nuisance in the Mint arose from the *annealing furnaces*, which are twelve in number; they are somewhat of the nature of a reverberatory furnace, and at times a high and continuous red heat is required to be kept up in them for several hours. Jucke's smoke consumers have been applied to two of these, and with perfect success, although, at the outset, many difficulties presented themselves, more especially as regarded the destruction of the brickwork and of the bridge; but by the adoption of a *water-pipe* at the bridge, and the careful construction of every part of the machine and furnace, these difficulties have been successfully encountered, and the two furnaces produce scarcely any smoke. As regards the *economy* of these furnaces, Dr. Brande's experience again coincided with that of Mr. Fraser: the saving in the *quantity* of coal appears unimportant, though certainly in favour of Jucke's consumers; but as respects *quality*, the smoke-consumers being exclusively fed with *screenings*, or small coal, the saving is very considerable; at one period we were paying nineteen shillings per ton for our usual engine coals, and only ten shillings per ton for the screenings; but it is most important that the *small coal* should be of good quality, for we have frequently been supplied with a very mischievous article under that name, being apparently the refuse and sweepings of the barges, or of the coal yards, and consisting of anything but good coal; this, of course, not only does not burn as it should, but clogs the bars with dirt, or clinkers, or in other ways seriously interferes with the smooth and satisfactory working of Jucke's machinery. Dr. Brande expressed a hope that Lord Palmerston's act would be productive, not only of diminution of smoke, but of various and great improvements in the construction of furnaces and the economy of fuel; and that its regulations would more especially put an end to the grievous smoke nuisances of the steamers on the river, which were equally annoying to the passengers, to the inhabitants of the banks, and to those passing the bridges. It was much to be regretted, that the act did not extend to the still greater nuisance of the steamers below bridge.

Mr. Siemens had understood Mr. Tomlinson to say that, although we might succeed in allaying the emission of visible smoke from chimneys, we should still have to suffer from the pernicious influence of the legitimate products of combustion, namely, carbonic acid, aqueous vapour, and nitrogen gas. He did not apprehend any inconvenience from the emission of those gases. The carbonic acid gas was a very necessary constituent of our atmosphere, upon which the entire vegetable kingdom depended for its growth. The aqueous vapour returned to the earth in the form of rain, and the nitrogen, which constituted the greater part of our atmosphere, passed through the furnace without undergoing any change. It, therefore, appeared to him (Mr. Siemens), that the prevention of visible smoke was important in a sanitary point of view, and he had no doubt that it was equally so considered commercially. He considered, however, that before entering into the examination of any of the specific plans which had been brought forward in late years (and their name was legion), the meeting should determine on the essential conditions on which perfect combustion depended. Those conditions were, in his opinion, firstly, The greatest attainable intensity of combustion; and, secondly, The supply of sufficient air to the fuel in its state of greatest incandescence to perfect the combustion. In support of the first proposition he might mention the able experiments of Mr. D. K. Clark, on the furnaces of locomotive engines, which went to prove that the economic evaporation of a boiler was increased inversely in the square ratio as the grate surface was diminished. More recent analyses of the products of combustion contained in the smoke boxes of locomotive engines, by the French philosopher, M. Ebelman, proved that combustion was almost perfect in a passenger-engine with a thirty-inch fire. In goods-engines, with forty inches thickness of fire, and less draught, he found a small per centage only of carbonic oxide. The supply of a sufficient quantity of air to the furnace might be effected in two ways, namely, either by regulating the depth of fuel on the bars in proportion to the available draught, or by admitting air, behind the fire bridge, to the products of imperfect combustion. He deprecated the latter mode of proceeding, because the temperature of the fire was already considerably reduced behind the bridge; but, supposing even it were not, it was a well-known fact that combustion ceased altogether in an atmosphere which was already highly charged with carbonic acid. This observation did not apply forcibly to Mr. Stevens's furnace, in which the air was admitted before the bridge, and in a highly heated state. The conditions of obtaining perfect combustion, under variable conditions of draught, were, he thought, complied with in the furnaces of Jucke and Hazeldine, which he considered were ingenious adaptations of Mr. Bodmer's furnace with travelling bars. The expense and liability to derangement were, however, serious objections.

He had had occasion to apply Mr. Hunt's furnace, consisting of slanting bars, upon which the fuel fell from a hopper by its natural gravity. At the first, the combustion was imperfect, but by providing a means of altering the inclination of the bars, and thereby the thickness of fuel to the conditions of draught, he had obtained a very perfect result. This furnace required, certainly, occasional attention to prevent the fuel from clogging in the bottom of the hopper; but this objection, he considered, was amply outweighed by its comparative simplicity.

Mr. ROBT. ROUGHTON said that the length of the furnaces was generally greater than could be managed with ease, and that it was extremely difficult to keep a furnace of a length of eight or ten feet covered with a thin layer of coals. In marine furnaces the engines were made smaller, and they were much more manageable on that account. He feared that Mr. Jucke's contrivance would not work well if subjected to a very great draught of air.

Mr. LOWE remarked that gas companies were less sinners, in respect of emitting smoke from their works, than, perhaps, any other traders in the kingdom; and when he assured the meeting that it was a fine to use one ounce of Newcastle coals in their furnaces, he thought they would agree that not much smoke could be seen from their chimnies. They only used coke. He would just say as an encouragement to those present, that the prevention of smoke was no such difficult matter after all. All that was required was a knowledge of combustion. In the premises of his father, at Derby, who was, 30 years ago, one of the most extensive malsters in Great Britain, 200 quarters of malt were dried with the aid of two furnaces supplied with bituminous coal, without a chimney, and without a particle of smoke. The supervisors and excisemen could not understand it, and persons went down from the Board of Excise to inspect the malting-house, but they could not imagine how the heat could be passed through the malt without a chimney; and yet the men employed by his father were men earning 12s. or 15s. per week wages. The way in which it was effected was by passing a current of air from the front over the whole, and adjusting the fuel in front, as it was now done in the furnaces at the Mint. He had often occasion to cross in the steamer from Holyhead to Kingstown, and he had remarked the splendid bow of carbon which the "Columbia" left in her wake from port to port. He had pointed it out one day to the captain of the vessel, and he had been permitted to try the experiment of stoking three of the furnaces every ten minutes instead of every twenty minutes; and by leaving the furnace door on the latch, instead of closed tight; the result was that the smoke all disappeared; and from that day to this the engines of the "Columbia" were enabled to make twenty-one revolutions per minute instead of nineteen; and no black smoke was ever seen from her funnel, to pave the sky with carbon from port to port.

Mr. FRASER, after thanking the meeting for their approval of his remarks, expressed regret at the form which the discussion had assumed. He had confined himself to the details of one successful plan, in the hope that others, including Messrs. Stevens, Hall, and Hazeldine, would have detailed the plan adopted in their furnaces. Mr. Fraser then explained the working models of Hall and Hazeldine—which were exhibited—both of which he had seen in successful operation at Messrs. Price and Co.'s works on the preceding day, and both of which made a fire and consumed its smoke in a way which left nothing to be desired. Hall's consisted of a series of bars, cast the whole length of the fire, which were moved alternately by an eccentric shaft in front; the movement was very slow, but the effect was to supply the fire with fuel from a stopper in front, as in Jucke's. Hazeldine's patent accomplished the same results by a different arrangement of bars, which were cast the width of the fire, transversely with the boiler. A peculiar motion was given by a cam to each of the bars, the object being to supply the fire, as in the other places mentioned, from a stopper in front of the furnace door being opened vertically by a rack and pinion. In conclusion, Mr. Fraser remarked that the foregoing plans would be effectual in a very large portion of the furnaces at present in operation, which would come under the regulations of the New Act. He had no doubt difficulties would arise in the application to chemical works, and dyers' pans, to which it was not practicable to apply these machines. He thought steam might be advantageously applied, or, where a high temperature was required, a modification of Neilson's hot blast might be adopted; but here, of course, he did not speak from experience.

The CHAIRMAN then thanked Mr. Fraser, in the name of the Society, for the excellent, interesting, and suggestive paper he had just read, and expressed a hope that the number of inventions now before the public would shortly cause an almost universal abatement of the smoke nuisance.

The Secretary announced that at the meeting of Wednesday next, the 7th of December, a paper would be read "On Miners' Safety Lamps," by Dr. Glover.

ON RECENT IMPROVEMENTS IN CHRONOMETERS. (a)

BY E. T. LOSEBY.

In the first portion of the paper which I had the honour of reading before the Society last session, the train and escapement of chronometers were particularly alluded to, and the following conclusions were drawn from the arguments adduced:—

"That timekeepers which go for long intervals with once winding up, are inferior in principle to those which go for short ones, and that, consequently, chronometers which only go two days, besides being less expensive, are better than those which go eight days, as any irregularity in the wheel-work or main-spring adjusting, would more frequently correct itself;

"That perfection of form in the train-wheel teeth does not contribute much to accuracy of going, and that the hardness of the wheels and pinions, the suitability of the materials, &c., and the smoothness of the acting surfaces, will enter quite as largely into the question of durability as perfection of form in the teeth; and

"That the chronometer escapement has not been improved since it left the hands of Arnold and Earnshaw, in the last century, and that experience does not point to the escapement as the source of any remaining error."

It is not now intended to introduce the subject of watchmaking generally, but manufacturers would do well to make themselves better acquainted with the improvements which have been made in the higher branches of horology, in order to apply them to the cheaper kind of watches so far as expense will allow; for, taken altogether, there are probably few arts in which the manufacturers and workmen possess so little knowledge of what really contributes to excellence as do the generality of persons engaged in watch and clock making: their attention having been directed more to mechanical workmanship and cheapness of production, than to the theory and principles upon which the various contrivances are based. Had greater intelligence prevailed, the compensation-balance would not have remained comparatively unemployed in lever watches, nor should we have had such instances as the substitution of gold balances for steel ones—gold, as a material, being in every way inferior to steel, from its expanding more with heat, and being more easily bent or scratched. The great liability to error which the compensation-balance prevents, should cause it to be univer-

(a) A Paper on this subject was read at the Twenty-second Ordinary Meeting of the Society, Ninety-ninth Session, May 25th, 1858, and an abstract was published in this Journal at the time, vol. 1, p. 313.

sally applied to duplex and lever watches, not, indeed adjusted with the same care as in pocket chronometers, for the small difference of cost between one kind of escapement and another, compared with the value of the watch as a timekeeper when completed, renders this course at all times undesirable, but merely passed through the first stages of approximate adjustment, which could be done at comparatively little expense.

In chronometers, where the greatest attainable accuracy is required, the adjustments should be continued so long as any constant error is appreciable; and it would therefore be a delusion to suppose, if an article possesses a chronometer escapement and balance, it will of necessity be a good instrument. These are only the elements which afterwards require a long series of adjustments, for, however fine the mechanical workmanship may be throughout, it alone will prove of no avail. These adjustments, which may be called the mental workmanship of the chronometer, are not commenced until every part has been made, and the chronometer, so far as the eye can detect, finished. They occupy, on the average, twelve months in the finest chronometers, but numbers are manufactured and sold in which the adjustments have been run over within a month; it will not, therefore, appear surprising if, when a chronometer of the best mechanical workmanship is placed before a maker, he is unable to say, without a trial of six months, whether, as an instrument, it may be worth 30*l*. or 60*l*. The first of these adjustments relates to the balance-spring, which should be so adjusted that the vibrations of the balance, whether long or short, should be performed in the same time, in order that when the chronometer becomes dirty, and the oil thick, the time may not be altered from the diminished power transmitted by the escapement, and the consequent diminution in the length of arc or distance which the balance vibrates. The second adjustment refers to the compensation for temperature—the only point in which any well established improvement has been made within the last half-century. The method of effecting this adjustment will be better understood after the balance has been described. The third adjustment, for positions, is not particularly required, except for pocket chronometers, as box chronometers are kept in nearly the same position, by being suspended in gimbols. With the pocket chronometer, however, the case is different, as it must follow the positions of the wearer, for all of which it consequently requires to be adjusted. These may be resolved into five principal positions, one having the plane of the balance horizontal and four vertical, which can be adjusted, with a little aid from the balance-spring, by four screws placed at the quarters on the diameter of the balance; these are screwed in or out, so as to alter their relative distance from the centre—as the chronometer, on being placed in the different positions, is found to lose or gain. It is by similar screws that the mean time or rate of all chronometers, whether box or pocket, is regulated, for this is not effected by a curb, as in the ordinary watch, which, from its acting on the balance-spring instead of on the balance, would entirely destroy the isochronous adjustment for change of arc. The regulation of chronometers is therefore, very judiciously, taken out of the power of the wearer.

The reason why a compensation for change of temperature is required, is that the balance-spring of chronometers, watches, &c., upon the invariable force of which the time depends, is subject, in common with all springs, to become weaker as the temperature is increased. This causes the chronometer to lose, and the error is further augmented by the expansion of the material composing the balance itself; the loss amounting altogether to about 380 seconds a day in a change of temperature from 32° to 100° Fahrenheit. It is to remove this error that the compensation-balance, invented during the last century, is employed. It consists of an arm having a concentric circle or rim, composed of two metals, firmly united together by melting one upon the other. These metals are selected of different expansibilities, such as brass and steel, the metal expanding the most being placed on the outside. The rim is divided on each side the arm, and weights are placed on opposite portions, and as the metals on an increase of temperature cannot expand in a direct line, on account of being connected, the expansion of one over the other causes the rim to bend and the weights placed upon it to be carried in towards the centre of the balance, the effect of which is to make the chronometer go faster. The metals are united in order to obtain sufficient motion, as their simple expansion would be altogether inadequate to carry the weights a sufficient distance. The balance is adjusted by repeatedly trying the chronometer in different temperatures, and moving the weights backwards and forwards along the rim until the exact point has been found where one error will neutralise the other. So long as the errors are large, moderate intervals of trials will enable them to be seen, and an alteration to be made in the adjustment, but the nearer the compensation approaches to perfection the longer must be the trials in each temperature, before sufficient data are collected for making the alteration, while the chances are proportionably greater that it will be altered too much. Of course it occasionally happens that the adjustment is effected in a shorter time, but, from the liability of new chronometers to change their rate, and other causes, it is not advisable that the final adjustments should be completed within a much shorter period than twelve months.

It will now be seen why the finest chronometers generally occupy so much longer time than others of inferior merit. In speaking of the finest chronometers, those having the ordinary balance cannot now be included, as their errors, when most perfectly adjusted, are still sufficiently large to be seen without very long trials, on account of what is generally called the supplemental error. This cannot be corrected by the ordinary means, as the balance-spring loses its elastic force at an accumulating rate, over the effect produced by the compound laminæ of the balance, and consequently the chronometer can only be adjusted to keep the same rate at two points on the thermometer, between which it will gain. If, for instance, it is adjusted at 35° and 80° Fahrenheit, which are probably the best points that can be selected for the ordinary balance, on account of the error being divided and distributed pretty equally throughout; then, taking its rate at mean temperature for comparison, the chronometer will be found to lose, whether the temperature be either increased or diminished, the loss increasing as the extremes become greater. For special purposes, however, chronometers are sometimes compensated at one extreme, of heat or cold, and mean temperature. This proportionably reduces the error in the interval between mean temperature and the extreme for which it is adjusted, but doubles it at the opposite extreme; this method is very objectionable for general use. The following appear to be the conditions which a perfect compensation for the secondary error should fulfil. 1. It should gradually accumulate in effect from one extreme of temperature to the other, in the proportion required by the change of elastic force in the balance-spring. 2. The secondary compensation should be susceptible of adjustment by rule alone; for if this could only be effected by actual trial, as in the primary compensation, the extra time required would preclude the probability of its coming into general use. 3. After it has once been adjusted, the compensation should remain permanent and not be liable to derangement. 4. The secondary compensation should not interfere in the slightest degree with the action of the primary compensation; for as the motion of the laminæ in a large box chronometer only amounts to 1-250th of an inch to produce a difference in the rate of 380 seconds a day, in a change of temperature from 32° to 100° Fahrenheit, any such interference would eventually prove fatal to the chronometer's good performance.

(To be continued.)

Home Correspondence.

PROPOSED NEW COLONY.

SIR,—As colonization embraces the topics to which your columns are devoted, by subjecting unoccupied countries to the productive labours of science, art, and commerce, permit me to make your readers acquainted with the remarkable territory to which my steps are about to be directed.

The northern coast of Australia is indented by the great Gulf of Carpentaria. This gulf penetrates the interior for 600 miles, and it is 300 miles in breadth. There is no obstacle to its navigation, and on its southern shores a fine harbour has been already surveyed by the Admiralty. Many rivers fall into it, one of which has been ascended in boats for sixty miles, and is navigable for vessels drawing twelve feet of water for thirteen miles. There are several larger rivers, which have only been crossed at various distances from the shore. The maritime communication which thus pertains to the territory around this gulf, is enhanced by its connection with the great Mediterranean channel which intersects the Indian Archipelago, and extends along the eastern coast of Asia. The direct association of an Australian settlement with the traffic and immense natural resources of the Indian Archipelago, must be of great commercial importance. I beg, therefore, slightly to trace the natural connection of the Gulf with the shores of the Archipelago. The eastern coast of the Gulf is almost joined to the south and south-west coast of New Guinea by the islands of Torres Straits. The channel here bends round from a meridianal direction to a course parallel with the equator. The line of land passes from New Guinea through Ceram, Bouro, and other islands of the Molucca group, to the great islands of Celebes and Borneo. It then turns to the northward, and presently follows a north-eastern direction to the Phillipine Islands, thence to Formosa, the Loo Choo Islands, to those of Japan and the Kurile Islands; and the continuation of this side of the channel may be considered, for the present purpose, to terminate in the peninsula of Kamschatka. The western coast of the gulf is prolonged in a line almost parallel to that which has been just described. On this side, the Arafura Sea is interposed between Australia and the Archipelago. But beyond this interval, the line continues through Timorlant, the Serwatty Islands, Timor, and other islands, to the great islands of Java and Sumatra, across to Singapore and the Malay peninsula, and from thence along the coast of Asia; the general tendency of that coast being north-easterly, and parallel to the continuous range of large and productive islands which so peculiarly distinguish it. The connection of the coast of New Guinea with the eastern coast of the gulf is so intimate that the first explorers considered them continuous. The native navigators never extend their voyages beyond the influence of the periodical winds, and they seldom venture far from land. They carry on a great traffic from one island to another, in small coasters and boats of all sizes, and it may be presumed that the close connection of the shores of the gulf with the shores of the Archipelago, highly favours the prospect of these little vessels bringing cargoes to any settlement which may be formed in the gulf. One inducement will be the consumption of the settlers, and another the exchange of native produce for British manufactures, which are highly prized and find a profitable market in those seas. The articles brought from the Indian Archipelago are cloves, nutmegs, mace, pepper, rice, cotton, oil, indigo, tamarinds, betel-nut, gambier, antimony, cassia, ratans, dragon's blood, cane, sapan wood, turmeric, mother-of-pearl shell, tortoise-shells, sandal wood, ebony, sago, bees-wax and honey, benzoin, ivory, camphor, birds of paradise, striped and tartan cloths, gold, hides, and many other articles.

The shores of the gulf were explored by Matthew Flinders, Commander, R.N., in 1802-3. The eastern coast of the gulf forms the western shores of York Peninsula, of which very little is known. The southern coast rises from the shore to an immense plateau, which was discovered by Captain Stokes, R.N., in 1841, and called by him "The Plains of Promise." These plains and the whole of the territory on this part of the coast were traversed subsequently by Dr. Leichardt, in 1845. The soil is a light-coloured mould, of great depth, and Sir William Hooker has declared it to be of a rich quality. Palms, bamboos, gums, and acacias occur along the watercourses, and in clumps over the plains. Cotton, tobacco, grain, oil, and other vegetable products of those latitudes may doubtless be cultivated with advantage. The nutmeg grows wild there. On the western side the country is mountainous. Iron and other minerals have been discovered. Leichardt dwells strongly on the value of the country for grazing; and he says of his own beasts when they were passing around the gulf that they were in capital condition. The proximity of the coast to India, and the favourable character of the sea passage through the Archipelago, will probably promote the exportation of horses to our Indian possessions. Sheep have already reached the neighbourhood of Peak Range, within 500 miles of the gulf; and it is believed that the climate nearer the gulf is more favourable than that of the Peak district. Elevated ranges rise at no great distance from the coast, both to the eastward and westward.

The temperature of this country has been observed instrumentally by Captains Flinders and Stokes. The former passed around the coast between November 4 and March 6, during the hottest months. He found the thermometer ranging between 81° and 87° on shipboard. He says that it may have been from 5° to 10° higher on land, and that the weather was consequently warm, but, being always accompanied by breezes, either from sea or land, it was seldom oppressive. Captain Stokes made a survey of Port Flinders, or Investigator Road, on the southern coast, in 1841. He ascended the River Albert, and discovered "The Plains of Promise." In the months of July and August, while he was there, the thermometer was observed as low as 51°, and it was usually below 62° till 7 a.m. and after 6 p.m. This remarkably low temperature was afterwards observed by Dr. Leichardt during the same months in 1845. He particularly draws attention to the complaints made by his party of "cold nights;" and he states that "the bracing nature of the winds and of the cold nights, had a very beneficial influence on our bodies; we were all well." In another passage, Dr. Leichardt says, "The state of our health showed how congenial the climate was to the human constitution, for, without comforts, without flour or salt, and miserably clothed, we were all in health." I have shown elsewhere that the highly favourable condition of the climate and temperature in these latitudes is by no means anomalous, although at variance with the opinions concerning inter-tropical climate which are entertained both by the learned and the public. Your space prevents me from enlarging on this topic.

The geographical position, foreign trade, agricultural and pastoral capabilities, and healthiness of the new country, having been now briefly described, I proceed to bring under consideration the process of colonization, whereby this new country can be rendered tributary to the prosperity of its settlers, to the vast colonial consumption of British manufactures, and to the supply of raw materials, which is, of itself, a question of preponderating importance.

Colonizers have now open to them a very wide extent of experience in the actual practice of settling new countries. While our own colonies have imposed on actual settlers a series of disasters and difficulties, arising entirely from administrative errors, of which the Canterbury settlement is a recent example, the United States have developed a simple process, which has attracted to its waste lands the largest share of European emigration, and has produced a considerable revenue as well. Nothing

can be more simple than this process. It boasts of no "art;" it is based on no mysterious theory; but it appeals to common sense. When it is determined to bring any waste lands into the market, or, in other words, to form a new territory or colony, a land-office is established on the spot, the whole area is surveyed, allotted, and made ready for sale, at the upset price of 5s. 3d. an acre. Every sale is registered, and a Government title is granted to the original purchaser. After all expenses are paid, including a liberal provision for any natives that may have occupied the country, a profit remains to the Revenue of about 4s. 4d. per acre. A department of the land-office settles all disputes that may arise in regard to boundaries or other matters. Congress passes an Act whereby administrative institutions, on a representative basis, are provided for the management of local affairs in the new settlement; and then its further progress towards the full dignity of an independent confederate State depends on itself. All this is perfectly consistent with the principles of *English* common law, on which the laws of the United States are mainly based. The Colonial Administration of the mother country is quite inconsistent therewith; for, instead of providing for local administration, on the pure representative system of our forefathers, it makes the colonists dependent on mere officials, and the disgraceful state of Melbourne is an illustration of the result. I have proposed a return to the "old ways," and there is abundant evidence to show that but few civilized nations are, or can be, really unfit for the simple exercise of municipal privileges and local administration. Existing circumstances suggest a course for the preliminary establishment of the settlement, which is at once simple, economical, and effective. Captain Stokes, R.N., who discovered the fine territory on the South coast of the Gulf, is prepared to return there in H. M. surveying steamer *Acheron*, which is now idle at Sydney, to complete the coast survey. The addition of a few sappers or others, as assistant-surveyors, a secretary, &c., would enable him to undertake the duty of starting the settlement; and the enlargement of the establishment should depend on the accession of revenue from land sales.

Whatever course H. M. Government may adopt, there is no difficulty in finding population to occupy the new territory. Those who are best fitted to encounter the first difficulties of settlement are near at hand, in the persons of the squatters and old colonists of New South Wales, who are well aware of the profits which accrue to those who get possession of the best localities. I must not enlarge on this point, but it is considered quite unnecessary to entice emigrants from home; for those whose connections with Eastern trade and tropical pursuits, or expectations of profit, or enterprising dispositions, fit them for the work, will easily find the way to the settlement whenever it is started. In the meantime, it will give me pleasure to meet any persons of that stamp. A note addressed to me by an eminent colonial authority, supplies all that need be said on the important subject of labour,—"From what I observed during a residence of some weeks in the Indian Archipelago, I should say, that really intelligent and active operatives, of all classes, might be procured from China to an unlimited extent, and almost without cost." This observation is fully confirmed by abundant evidence, and the influence of such a prolific source of labour on the production of staples, may hereafter wield no mean influence over the foreign markets on which our manufacturers now depend.

The position of the new settlement, with regard to Sydney, Melbourne, and Adelaide, gives it superior advantages. The principal imported articles of consumption in Australia are tea, sugar, and tobacco. These are derived from Manilla, Java, China, &c. Those places are not only much nearer to the new port, but the voyage is also much safer. Prices will consequently rule in favour of the northern port, and a wide range of the interior will bring its produce there, from whence supplies can be drawn at the cheapest rate. Its postal communication with Europe and Asia can also be effected with superior despatch by means of the Overland Mail, which now reaches Batavia in 46 days from England.

I have now only to wait for the decision of H. M. Government.

I am, Sir, your obedient servant,
TRELAWNY SAUNDERS, F.R.G.S.

GOLD CRUSHING AND WASHING.

SIR,—Having read in the last number of your Journal a paper, by Mr. C. Stansbury relating to gold crushing and washing, and the discussion which took place at the meeting of the Society, I beg leave to make one or two remarks upon the same. And first I may perhaps be allowed to correct a slight error into which Mr. Stansbury has fallen respecting the gold of Mexico. He says it is there "always found associated with silver." It would have been better to have said "it has hitherto generally been so found;" the fact being that gold occurs in its free state in various parts of Mexico, in Sonora, in El Doctor, near Tasco, and recently it is said to have been discovered on the river Mescala. It exists in large quartz veins in several places, but which are so arid and bare of water that it would be almost impossible to work to advantage.

I now come to the more important part of Mr. Stansbury's paper—that which relates to Berdan's new Amalgamator, the chemical novelty in which consists, it is said, in the heating of the mercury, which has never been attempted on a large scale before. I turned to Aiken's Chemical Dictionary, article Gold, and there I found a description of the method used in Hungary for separating the gold from quartz. After describing the stamping and pulverizing, the writer goes on to say, "The mixture of pulverized gold ore and mercury is rubbed together for some time by means of a wooden pestle, to expedite the incorporation of the mercury and the gold, and is afterwards heated in a proper vessel, to about the temperature of boiling water, for three or four days; finally, the mixture is washed," &c. But besides this evidence that the application of heat is no novelty, it is well known in the establishments for the amalgamation of silver ores, that the application of artificial heat has been used and tried in various ways, over and over again; in some cases it has been useful, in others thrown aside. That it assists the amalgamation of the gold with the quicksilver is not disputed; but it is no novelty.

Without touching upon the question of the merits of Mr. Berdan's grinding and amalgamating machine, I must be permitted to say that the separator attached to it for saving the stray amalgam from the residues, by passing these through a body of quicksilver, is not new. The merit of proposing, in this country, the adoption of that principle aided by centrifugal force, is, I think, due to an American gentleman, who brought it here about the end of 1851, at which time it was little noticed. It, however, occurred to me that it would answer very well to pass the residues from the silver reduction works through a column of mercury, provided a sufficient fall could be obtained; and in a letter, dated January 15, 1852, to the Superintendent of the Fabrica of the Bella Raquel Company, in Spain (of which Company I am the Secretary), I suggested a trial. It seems that it was difficult to obtain a sufficient fall, and, to obviate this difficulty, Mr. Edward Rowse, the engineer, invented a very ingenious apparatus, which answered perfectly, and is certainly superior to Mr. Berdan's. By this time the reduction of gold ores attracted great attraction; and in the spring of 1852, Mr. Richard Taylor, being then on a visit to Spain, and seeing the success which had attended Mr. Rowse's machine, applied, as it had been, not only to the residues but to the whole of the slimes from the barrels, determined upon having a trial made in England on gold stuff. The result of this determination was the invention, by Mr. T. B. Jordan, the Superintendent of the

Colonial Gold Company's Works, at Rotherhithe, of a machine in which the original idea of simply passing the stuff, with a column of water, through the mercury is reverted to, but with additions and applications which render it one of the most economical and beautiful machines for separating gold yet invented, and for which, so far as I am aware, no patent right can or will be claimed.

Every man is entitled to be fairly rewarded for his ingenuity; but when there is a disposition to overrate any particular invention, it is right to put the public on their guard.

I am, Sir, your obedient Servant,

JOHN PHILLIPS.

6, Queen-street-place, Upper Thames-street, Nov. 29, 1853.

DECIMAL COINAGE.

Sir,—Being engaged in paying the workmen in this establishment, involving a considerable number of payments in shillings and pence, weekly, I feel some degree of interest in this subject. I cannot view the introduction of such a small division of the pound into 1000 parts without some alarm, as such, as far as I can learn at present, is the plan recommended by the commissioners engaged in investigating the subject. At present the fractional part of a penny is seldom found in the books of the manufacturer and merchant; but when the mil is introduced as the unit of the decimal part of a pound, I fear it will enter into every transaction, however small or large such transaction may be: and its effect will be rather to increase than decrease the labour, of all parties engaged in paying and receiving money in coin, and accountants, with whom, principally, will be the labour of practically carrying out the change.

Permit me to lay before you the following plan for your consideration, trusting that it will meet with that attention you are accustomed to give to questions affecting materially the well being of society in general. I would, therefore, suggest that the half-sovereign should be the unit, and consequently the shilling would be the tenth part of it, as at present, and a trifling change made in the penny, by an addition to its value of one-fifth, making it the tenth of the shilling. By such an arrangement, we should have, as at present, an unit of the gold coin, an unit of the silver coin, and an unit of the copper coin, which is of considerable advantage in counting money. We should also reduce the places of decimals to two instead of three figures, and, therefore, lessen the labour of calculations. Any amount, say, 1*l*. 19s. 4d. would be written thus, 3.94, or three units (substituting any name that might be agreed upon), nine shillings and four pence.

The sub-division of the penny I would still represent by ¾, ½, ¼, leaving it to parties to drop them without embarrasing their accounts. Under some such an arrangement as this the present coinage need not be disturbed; but, after a certain day, the pennies now in circulation should become the tenth of a shilling, and the change is complete.

The present copper coinage should be gradually withdrawn, and new coins substituted of the proper size. This alteration would involve a loss to the Government of about one-fifth of the amount of the value of the copper now in circulation, but would spread over the time the process of withdrawal would be carried on. This loss would, I presume, be more than compensated by the increased payment by postage and receipt stamps, and which the country would gladly pay for the increased accommodation thus secured. The only objection I see to this plan is, that the sovereign is associated with all our ideas of the value of commodities, &c. But it may still be retained in all Government securities and bankers' notes without inconvenience; all that would be necessary for entry in books or calculation, would be, to double the number of the pounds to reduce them to the new coinage. The pound would be a multiple of the unit of the gold coin.

Yours, &c.,

H. BEVAN.

Llanelly Copper Works, Nov. 28, 1853.

RAPE SEED OIL.

Sir,—Some years ago my attention was drawn to the extraordinary properties contained in the rape seed oil, for softening and restoring flexibility to manufactured leather goods, in fact producing the like effect on the skins of animals generally. On introducing it to my friends, its use was suggested for lubrication. On a first trial upon a pair of marine engines, which had been making eighteen revolutions per minute with olive oil, the speed was increased to nineteen revolutions; but on a subsequent trial with another sample, the speed was reduced below sixteen revolutions, showing a great want of uniformity in the quality of the material. This circumstance led to some research on the subject, and having now spent seven years in the cultivation and treatment of the products of this article, a few particulars relative to the history and great value (as a British product) of the British rape plant may not be uninteresting.

As my remarks will refer more particularly to the oil, it will be necessary, to a proper appreciation of the subject, to give a few details relative to the properties of oils generally.

This oil may be considered one of the three primary fixed oils, viz., Flax or Linseed, the Olive, and the Rape; all other oils being mere modifications of one or other of these. Flax oil possesses the peculiar property, when exposed to the atmosphere, of absorbing its oxygen, and forming a substance capable of great duration; rape and olive, on the contrary, possess no affinity for that gas, and are termed non-drying oils. These three oils, being vegetable products, possess those properties only in proportion to the state of cultivation of the plant. The ancients, from the earliest period, understood this, and obtained from the vegetable kingdom these three oils in a state of perfection and purity that we have but an imperfect knowledge of. This is apparent in the construction of their lamps, which principally take the form of the berry of the olive, the seed of the rape, and the almond.

The ancient Greeks and Romans were extensive manufacturers of lamps in terra cotta, principally after the rape pattern. They are nearly all ornamented with devices of various kinds. On some are found the rape plant; others bear the shape of the rape pod, with a number of lights corresponding with the number of seeds in the pod. This, I think, is conclusive that rape was the oil consumed in them. It would also appear that this oil was employed for producing heat, on precisely the same principle as gas is being employed at the present day. The formation of some of the lamps, with their numerous burners, indicate it; and the number of vases and other terra cotta vessels also present the way in which they were employed. In the British Museum there are two vases (Nos. 2595 and 2557) of this kind. The first is a flower vase, the body of which is intended to contain a lamp, the sides being perforated to admit the heat of the lamp to act upon the projecting tubes, which are presumed to contain the essential oils of the flowers placed in the small vases at the end of the tubes. The action of the heat liberates the gases of the oils, and produces a powerful odour. The second vase is formed to admit three lamps, with one or two burners each, and perforated to admit air for combustion, so that any amount of heat could be employed. It might be used for domestic or other purposes.

It must be observed that asbestos was employed in those lamps as a means of combustion, and, with a pure oil, would produce a brilliant light and a powerful heat. The Romans were also exporters of those lamps, and introduced them into Britain; and, it is not improbable, introduced the rape plant also. Be this as it may, the

rape has flourished in the three kingdoms for several centuries, and, with the flax, supplied these countries with the principle portion of the oil required. About the middle of the last century an increased demand sprung up, from the introduction of the woollen trade and its subsequent machinery. At its close, the cultivation had become so extensive, and such large returns had been made to the farmer, that the country took alarm. One celebrated gentleman stated to the House of Commons that, if immediate steps were not taken to stay the growth of oil, the land would become so impoverished that wheat would be ultimately lost to the country; and such was the popular feeling that no one would let a farm to grow rape. Consequently in a few years oil-growing ceased throughout the country; hence the facilities given to the whale fishery, and the importation of olive and other oils and seeds; the demand still increasing, until, in the past year (1852), the value of oils imported exceeded seven millions sterling. In the course of time these sources failed to meet the still-increasing demand, when, about sixteen years ago, a house in London introduced the rape under the designation of "patent refined" for burning in lamps. This gave a fresh impetus for the importation of rape seed, which has, and continues to be, brought from India and other eastern countries in vast quantities. A large proportion of it possesses a mere resemblance, but without the properties of the rape. The late King of the French gave great encouragement to the culture of this plant, and erected mills for the extraction of its oil, and we are now importing largely from France, Belgium, Holland, and some parts of Germany. The quantity brought from those countries during the first nine months of the present year, was 2,500,000 gallons, or what would be the produce of about 37,000 acres of land, if grown in England, Ireland, or Scotland. The importation of the seed during the same period from other parts was 51,576 quarters, or the produce, if home grown, of 11,000 acres. The largest proportion of this oil is of very inferior quality, and the seed particularly so.

The uses to which this rape oil is applicable are numerous and important. For artificial light very large quantities are consumed; the English and Irish lighthouses alone consuming about 150,000 gallons per annum. Railway and shipping companies are also extensive consumers. For manufacturing purposes it will supersede the olive as soon as a better quality is obtained. But the most important of all the properties of this oil is its adaptation for the lubrication of machinery, and the possibility of its becoming to mechanism what the synovia of nature is to the joints of the animate creation. To obtain this facility and economy in motion is a thing greatly to be desired by all who are interested in it and its progress. There are, I believe, other valuable properties in this oil which were highly appreciated by the ancients, to which I shall not further allude, only stating that, as they possessed it, it was without colour, taste, or smell.

The cultivation of the rape plant is best understood in some parts of Holland and Belgium, where it is grown to considerable perfection. It is sown about September, and reaped in the June following. In many cases the seed is sold to the crusher with a stipulation to return the cake, which is given to the cattle, and if a portion of the oil is given occasionally, it improves their condition and adds to their weight materially. The straw is bruised and converted into manure, when the whole is returned to the land again, charged with gases that produce most abundant crops of wheat. It is also a fact admitted by all the parties I have consulted in those countries most famed for the best knowledge on the subject, that although it is subject to a troublesome fly in two stages of its growth, yet it is the most profitable and inexhaustive crop grown by them. From these remarks it will readily be perceived, that the quality not only of this but other oils may be greatly improved by a more careful study of their cultivation; and the necessity for giving encouragement to their production at home and in the colonies will be apparent. It must also be borne in mind that there is a rapidly-increasing demand for this article for the purposes before-named. The soil in most parts of Great Britain and Ireland is as well adapted to the growth of rape as any on the continent, and there is no reason why we may not yet become exporters, instead of importers of oils. The English farmer has no prejudice against this species of produce; on the contrary, he is ready to enter into it, but he is no speculator. The distance manifested between the agricultural and manufacturing interests have been unfortunately such, that, however desirous the one might be to produce and the other to consume, neither have stepped out of their ordinary path, while the foreigner has all the time been reaping a rich harvest.

I am, Sir, your obedient servant,

WM. BROTHERTON.

Wandsworth, Nov. 26, 1853.

REPORT ON NEW ZEALAND FLAX.

CONTRIBUTED BY WM. CHARLEY, SEYMOUR HILL, BELFAST.

My first step, after receiving the request of your secretary, directing my attention to the communication forwarded by the Council of the New Zealand Society, on the subject of the "*Phormium tenax*," was to call public attention to the question, by publishing the letter of Mr. Roberts, extracted from your Journal, and my reply in the local papers. In the few introductory remarks forwarded to the Editors, I pointed out the liberal offer made by the New Zealand Society for the improved machinery required; and I have no doubt, when the large sample of Flax, so long promised, arrives, and is distributed, some of our clever mechanics may be induced to try their hands and heads at the invention of machinery for the purpose specified by Mr. Roberts. Having thus submitted the matter to public notice, I proceeded to gain as much information as possible about the plant. I found the objection hitherto urged against the fibre was its extreme brittleness, owing, it was supposed, to the large amount of silica in its composition; that this brittleness had been successfully overcome, by the application of a process invented some years ago, by a person named Burns; but that this process, though successful in its operation, was so expensive as to suit only in the laboratory. This Mr. Burns asked my informant, Mr. Herdman (an eminent Belfast spinner), the modest sum of, I believe, 20,000*l.* for the use of his invention, and showed, *on paper*, a beautiful theory of profits resulting therefrom, amounting to 14,000*l.* a year! Mr. Herdman was not sanguine enough to accept this proposal, and the matter fell to the ground. By the kindness of the latter gentleman, I am enabled to forward you, in different stages, three samples of the *Phormium tenax*—two in a partially prepared state, and one in yarn. The half of the rough Flax has been treated by Mr. Burns, exhibiting the extraordinary change effected by his process; the other half of the same stem being kept unaltered, to show the contrast. This process is of course a secret, but the result is believed to have been effected by the application of some powerful acid on the silica or silicates of the non-fibrous portion of the dried plant.

A peculiar quality of the *Phormium tenax* fibre is, that it *hackles* out to almost inconceivable fineness; the divisibility of the fibre appears very great, and the sample thread of yarn sent herewith will show how fine the first experiment in spinning at once reached to. The proposal of Burns occurred so long back as the year 1836 or 1837. Mr. Herdman thinks that Burns is alive, and in Manchester, but does not know his address.(a) Previous to my interview with Mr. Herdman, I had a communication with Mr. McAdam, the able secretary of the Royal Flax Society at Belfast, and he, as well as Mr. Herdman, have

(a) Dr. Robinson, of the Observatory, Armagh, was, I understand, the first person to recognise the talents of Mr. James Burns, who was a resident in that town at one time.

kindly promised their valuable assistance in promoting the investigation of this curious fibre. Having heard that the plant was cultivated in the Botanic-gardens here, I visited them, and found such was the case. Mr. Ferguson, the curator, at once pointed it out, and very courteously offered to give me specimens to take with me. I procured a sufficient quantity of the leaves for analysis, and submitted them to Professor Hodges, of the Queen's College, Belfast, and chemist to the Chemico-Agricultural Society, for examination and report. The following is the result of his analysis, annexed to which is given the composition of the Irish Flax:—

"Laboratory, Chemico-Agricultural Society, Belfast, 24th November, 1853.

"*An analysis of New Zealand Flax, and Irish Flax Straw.* One hundred parts of each contain respectively:—

	New Zealand Flax.	Irish Straw.
Water	60.39	56.64
Organic matters	37.88	41.97
Ash	1.73	1.39
	100.00	100.00
Ash per cent. in plants dried at 212° Fahrenheit	4.36	3.20

One hundred parts of the dried leaves of New Zealand Flax gave 1.64 parts of nitrogen, while 100 parts of Irish Flax Straw gave 0.53 of nitrogen. The Ash of New Zealand and Irish Flax respectively contain:—

	New Zealand Plant.	Irish Plant.
Potash	14.93	20.32
Soda	5.38	2.07
Chloride of Sodium	8.75	9.27
Lime	28.52	19.88
Magnesia	1.41	4.05
Oxide of Iron	1.21	2.83
Sulphuric Acid	4.64	7.13
Phosphoric Acid	18.96	10.24
Carbonic Acid	13.12	10.72
Silica	3.86	12.80
	100.78	99.31

"(Signed) "JOHN F. HODGES, M.D.,
"Chemist to the Society."

The excess of silica spoken of as the cause of brittleness does not appear in the analysis, but I think the non-fibrous portion of the "*Phormium tenax*" is more incorporated with the fibre than in the "*Linum usitatissimum*," and this combination may partly account for the brittle nature hitherto generally attributed to the fibre. If the silica exists in combination with the alkalies potash or soda, which I presume may be the case, I do not see any reason why such a silicate should not be soluble in hot water. Acting on this idea, I have tried the effect of boiling the leaves and rolling afterwards: in fact, adopting a system similar to Watt's patent, which, though not yet perfectly applied to Irish flax so as to please the linen manufacturers, may eventually be successful, and indeed appears the most likely way of managing this New Zealand flax. As yet I have no result to lay before you of these experiments, except that I deprecate the use of *much alkali* to soften the plant, or the use of *fire heat* in drying it, having found both add greatly to the brittleness of the fibre in the green state.(*a*) When I have any further information to give worth notice, I shall communicate such at once; in the mean time the facts I have stated and the analysis of the plant, will, without doubt, prove interesting to many readers of your useful journal.

(*a*) I found the plant dried by fire-heat rather quickly very easily broken; but after re-saturation with *water* it recovered its tenacity, and was not subsequently improved by slow-drying at a distance from the fire. The amount of alkali used in bleaching linen *appeared* destructive to this fibre; but I should not like to state this *positively*, without another trial.

Proceedings of Institutions.

ALTON.—The Mechanics' Institution has now been established 16 years, and during that time it has accumulated a library of 1,011 volumes. During the last winter fifteen lectures were delivered on various subjects, and two exhibitions of dissolving views, and three of microscopic objects, were held. An analysis of the members showed that there were, of subscribers paying ten shillings per annum and upwards, professional men, &c., 23; tradesmen, 37; of subscribers paying eighteen pence per quarter, tradesmen, 9; mechanics, 47; and apprentices, &c., 24; making a total of 140.

BATTERSEA.—On Tuesday evening, Mr. A. Coleman, of Wandsworth, delivered a very instructive and interesting lecture to the members and friends of the Literary and Scientific Institution, "On Combustion." The lecture was illustrated by experiments; and the principle of the Davy Lamp, Gas-lights, Argand burners, Oil lamps, and Ventilation were explained in a clear, intelligible manner. The vicar took the chair, and, at the close of the proceedings presented the thanks of the meeting to Mr. Coleman.

BURY.—The inauguration of the Athenæum took place on Wednesday, the 23rd of November. It has been erected by public subscription, in consequence of the insufficient accommodation in the premises occupied by the Bury Mechanics' Institute. The building consists of a large, lofty, and spacious Lecture Hall, gallery, and ante-rooms; the Hall is 85 feet long by 43 broad, and is 25 feet high. There is also a gallery capable of accommodating from 150 to 200 people. On the ground-floor there is a news room, 43 feet by 15 feet; a museum, 43 feet by 30 feet; a library 30 feet by 17 feet 6 inches; lecturers retiring room; one class room, 30 feet by 17 feet 6 inches; and a committee room. In addition to the above there are also, in the basement, three good class rooms, and the requisite offices necessary for such a building. On this occasion, E. Grundy, Esq., of the Wylde, the President for the year, after referring to the donations of the late Earl of Derby, and the patronage of the present Earl, introduced Lord Stanley, M.P., whom he requested to preside over the meeting. The following gentlemen were also on the platform:—The Bishop of Manchester; the Rev. C. Richson; the Rev. Dr. Vaughan; J. Cheetham, Esq., M.P.; N. Starkie, Esq., M.P.; J. Smith, Esq., of Liverpool; Richard Fort, Esq., of Read Hall; the Rev. the Rector of Bury, who is one of the Directors, and many other influential gentlemen of the town and neighbourhood. The Noble Chairman, after a few introductory observations on the value of education, said, that five years ago, in 1848, it was proposed to erect a new Athenæum; in two years the funds were so forward as to justify its promoters in beginning the building; in 1850, the corner-stone was laid, and now they had to congratulate themselves on its completion. There was one person, whose name was connected with this building, to whom he was not at liberty to refer; but this he would say in his father's name, that there was no man in public life, of whatever political party, who was more deeply and sincerely interested in this great question,—the question of the age,—the question of national instruction; no man more sincerely anxious to further instruction, and to raise all classes, especially the working classes, in the social scale. The Rev. Mr. Thorburn, M.A., read the report of the trustees on the building of the Athenæum, and also a statement of the classes now in operation. The architect, Sydney Smirke, Esq., had estimated the cost of the Athenæum at upwards of 4,000*l.* Towards this sum was raised by public subscription, rent of Hall, and other supplementary sources, the sum of 4,481*l.* The expenditure had been, for contracts for the building and superintendence, 3,468*l.*; for fitting up furniture and other matters, 1,038*l*; and for the bazaar and exhibition, 368*l.*; making a total of 4,874*l.*; and leaving a balance now due

to the treasurer of 393*l*. The Directors' report was then read, from which it appeared that in the first quarter of the Athenæum's operations, there were 454 members; in the second quarter, 587; in the third quarter, 584; and during the fourth, the present quarter, there were 700 members. The receipts up to the present time had been 402*l*., and the expenditure 312*l*.; leaving a balance of 52*l*. The Rev. C. Richson then addressed the meeting on the advantages to be derived from Mechanics' Institutions and similar societies. The Bishop of Manchester dwelt on the duties of employers to the employed in assisting to provide better education for the operative classes generally. Mr. J. Cheetham spoke to the value of libraries in towns like this, and also of the importance of village libraries. The Rev. Dr. Vaughan spoke of the advantages of education, as the forerunner of a nation's greatness; and alluded to those great but expired cities of bygone ages in illustration of the sentiment. Mr. Smith, of Liverpool, and Mr. Richard Fort, of Read Hall, also addressed the meeting.

BRIGHTON.—A special general meeting was held at the Mechanics' Institution, on Thursday, the 24th of November, for the purpose of receiving a letter from Mr. S. Robertson, presenting a model of the Holy Land, the property of the late Rev. F. W. Robertson, M.A., Vice-President of the Institute; and also for hearing a lecture from Mr. Harry Chester, on the subject of "Mechanics' Institutes." The Committee had invited the members of three or four other institutions in the town to be present, and a numerous audience was collected. After premising that they were to expect, not a display of eloquence, nor a philosophical disquisition on education, but a plain business-like talk about institutions, with a view to practical suggestions for their improvement, Mr. Chester adverted to the presence of the members of the other institutions, and pointed out the importance of a friendly co-operation amongst them. It struck him, as a stranger, that in such a place as Brighton it might have been better to have established one very large institution, instead of dividing their strength among five distinct bodies; and he suggested that, if it were not now too late to effect a junction, some kind of federation might still be established. Each of the five institutions might delegate one or two representatives, who should sit at a Central Committee, to promote the general interest of the institutions, and to provide for such joint action as might be found possible. He expressed his regret and surprise that the Pavilion, whose numerous and spacious rooms were open to the givers of balls and concerts, to "Wizards," and all sorts of shows, was not allowed to be used by these institutions. He pointed out their great value, as affording opportunities for the association of different classes, for innocent amusements, the occupation of dangerous leisure, for occasional and systematic instruction. Such institutions were necessary. Without them schools and churches wanted a necessary supplement. It was useless to provide schools, if you did not provide the means of using and completing what was acquired in them. It was useless to provide churches and clergy, if you left the people without innocent amusements and beneficial employment for their leisure hours. The question was, how could these institutions be best improved? They should continue to provide newspapers and circulating libraries, and amusing lectures, to hold *soirees*, and to take excursions; but they should do a great deal more than this. The extension of their libraries could now be effected at a great reduction of the prices of books and maps, in favour of those institutions which were in union with the Society of Arts. The Duke of Wellington's Despatches, which ought to be in every library in the kingdom, but on account of their high price (eight guineas) were in very few, could be had through the Society of Arts for four guineas. The statistical returns recently made to the society showed that the reading of this institution was above the average, though there was room for improvement in this respect. People were alarmed when they saw what a quantity of "fiction" was read by the members of a Mechanics' Institute; but was no fiction read by those who were not members? In order to raise the standard of reading, the great point was to lead the members to read with a purpose. Endeavour to interest a man in some particular subject, furnish him with a strong inducement to seek information respecting it, and then provide him with books, or with a living teacher to assist him. To the success of classes of continuous study a system of examinations, diplomas, and rewards was essential. It was hoped that such a system would be organized under the auspices of the Society of Arts, but nothing could be done without the co-operation of the institutes. Music and drawing classes should be established in every institution. It was not creditable to Brighton, with a population of 75,000, that it had no public drawing school, or School of Design. The pupils should be taught to draw at once from the round, and not from the flat. The late Mr. Butler Williams's method of drawing from graduated models was highly commended. In learning to draw, the pupils should be taught how they saw; and what were the causes of the differences between the real shapes and the appearances of things. How few people could give an explanation of the reasons why they saw only the lecturer's face and not his back! One of the causes why the French excel us in architecture, and in the manufactures into which design enters, was the general instruction in drawing from models in that country. Classes for research were also recommended. Why should not some of the members devote themselves to the pursuit of different branches of natural history? One class would take up the subject of the geology of the neighbourhood, another the entomology, a third the birds, a fourth the botany, a fifth the marine productions, &c., &c. Recently evidence of a highly contradictory character had been given by scientific men before a Committee of the House of Commons, on the subject of the rainfall on chalk; some insisting that the rain which penetrates the surface of the chalk is retained in large rivers and immense lakes in its substance; whilst others as confidently declared, that the rain penetrates the substance of the chalk, and finds its way into the sea at the feet of the cliffs. In the neighbourhood of Brighton it had been said that many such streams, issuing from the chalk, were to be seen. Why should not such questions be examined and ascertained from actual observation, by the geological class of this institution? Photography was becoming exceedingly popular. Why should not a photographic class be formed? The object should be to furnish various inducements to persons of various tastes and pursuits to join the institution. Facilities should be provided for the prosecution of such pursuits. Lists of books bearing upon them should from time to time be exhibited in the library. Mr. Chester strongly pointed out how necessary it was not only to extend but to improve the education of the whole people, high and low, rich and poor, young and old, and urged upon the members of the institutes that they should connect those bodies with the educational system of this country, and bring their influence to bear upon it. He explained the Government system of pupil-teachers, and showed what great advantages it offered to the children of the poor. He suggested that all the pupil-teachers of the different public schools in Brighton and its vicinity might be admitted free, or at a very low payment, to the institutes. This would be a great advantage to the children, would connect them in early life with the institutes, and the institutes with their schools, and excite a mutual interest. One of the great evils of the day was the early age at which children were removed from school. Let the institutes endeavour to counteract this tendency. Some employers of labour in different districts had provided prize-funds, for the reward of children being at some public school, and above twelve years of age, who passed the best examination in certain

specified subjects. This had an excellent effect. Why should not the five institutes of Brighton combine to collect a special fund, and to institute similar examinations? If the subjects selected for prizes were selected with judgment, the standard of instruction in the schools might be raised by directing the attention of the teachers to art and science and industrial training. This would have most important results, and excite such an interest in education as would prove of the highest value. What immense good might be accomplished if these bodies would thoroughly exert themselves in promoting the cause of education, instead of leaving it exclusively to the clergy, and a few benevolent and energetic gentlemen and tradesmen. He did not recommend the institutes to establish day-schools of their own, for that would introduce all sorts of religious differences and difficulties, from which it was essential that they should keep clear; but they might promote education in many ways. They might collect the statistics of education; they might show how many people in Brighton could neither read nor write; they might promote the efficiency of the schools and raise the ages of the scholars. When this was done, but not till then, there would be candidates in abundance for the Institute, and candidates well qualified to profit by its advantages. Mr. Chester then turned to the subject of social reforms, which he desired to see promoted by the Institutes. The working classes were too apt to seek through political reforms an improvement of their social position. He advised them to seek social reforms as the sure forerunners of political improvements. Politics they must carefully avoid, as opposed to their fundamental rules, and as fatal to that union of all classes of opinion, which was one of their greatest treasures; but political economy they might and ought to entertain. He briefly explained the English Law of Partnership with unlimited liability, and contrasted it with the French and American partnerships *en commandite;* and recommended the members to inquire into the subject, to diffuse information respecting it, and to cooperate with the Society of Arts in endeavouring to procure an amendment of the law. The same advice was given with reference to the duties on paper, the enormous duties on wine, oceanic postage, &c. They were also urged to promote an improvement of the dwellings of the poor, the establishment of baths and washhouses, allotments, early closing, &c., &c. They were not to undertake these matters themselves, but to collect and diffuse information, with a view to excite an interest respecting them. The Institutes ought to represent the intelligence of their neighbourhood, and to act as pioneers of improvement. They ought to collect and diffuse information on the subject of vaccination, to point out to the poor how much the recent statute for compulsory vaccination was calculated to benefit them, and so to smooth the way for its satisfactory working. Museums were then briefly touched upon. It could not be expected that there should be five good museums in Brighton; but the five institutions might contribute to one common museum. How much would education be promoted if, in every town where there was an Institute, there was also a museum, rich in all the natural and artificial products of the locality! Exchanges of specimens might now be made between the institutions in union with the Society of Arts. Every Institute should form a collection of local prints and antiquities. They should have exhibitions of useful inventions, for which arrangements might be made through the Society. The exhibition of photography, which the Society lent to the institutions in union, was highly popular. It was first sent to Woburn, where it was exhibited for ten days, at the expiration of which the Institute there had cleared a profit of 100*l.*, and had obtained one hundred new members. Attention was called to the Journal; and the address—of which the above is a very meagre account—was concluded by a reference to the laws which injuriously affect institutes, and to the probability of their being amended in the next session. Thanks were voted by acclamation to the lecturer.

HEREFORD.—The first soirée for the season of the Literary and Philosophical Institution was given on Friday last. The Venerable the Archdeacon of Hereford presided; and in his inaugural address referred to the progress which the Institute had made during the past year. Mr. Jelynger Symons then read a paper on "The Nature and Capabilities of Milford Haven," the peculiar mercantile and military capacities of which were, he considered, unequalled by any other harbour in the world. Rio and St. Francisco might rival, but did not surpass it. Cork and Naples were no more to be compared to it than the Wye with the Thames as navigable rivers. The peculiar features of Milford were that the entrance was nearly due south. From the mouth of the haven, lying between St. Ann's Head on the west to Sheep's Island on the east, the width was two miles and a furlong, which narrowed to one mile and three furlongs at the narrowest point between the east and west blockhouses. Over three-fourths of this entrance (with the exception of a few rocks, easily blasted or buoyed,) there was water enough to float the largest vessel at the lowest point of spring tides—varying in depth from fifteen fathoms at the west to seven fathoms at the east side; and the depth of the main channel, and of the greater part of the entire width from shore to shore, continued up the whole course of the haven, ranging from sixteen to nine fathoms up to Weare point, where it shallowed to five fathoms, thus affording an area no less than eight miles in length, and ranging from half a mile to a mile and a half in breadth; deep enough and large enough to contain nearly all the fleets in the world, with a good bottom for anchorage throughout. Nor was this all, for, owing to the turn to the N.E., which the harbour took almost immediately above its mouth, ships, once entered, lie sheltered from every wind that blew. This immense advantage was enhanced by the nature of the shores, which were sufficiently high on all sides to protect the loftiest ships, and were peculiarly free from gullies and eddies which could disturb the lake-like calm which reigned perpetually on its deep and placid waters. As to the topographical position of Milford Haven, it was several days' sail, even in ordinary winds, nearer to America and most of our colonies than Liverpool, with which it was impossible to avoid comparing it. Without exaggerating the difficulties of the navigation up St. George's Channel, round Anglesey, and up the Mersey, it will not be denied that they were formidable, both as regards time, cost, and actual danger. As regarded internal transit, Milford Haven was but about 15 miles further from London than Liverpool; and it was for all England, incomparably the best starting point for the entire western hemisphere. The Rev. Dr. BARTLETT then read an elegantly written paper on the drama of ancient Greece. Having observed that the word δραμα meant "action" and its motives directly, and that in it the course of the story and the feelings of the parties concerned were judged of by what was said and done by the actors, rather than from any description of circumstance or sentiment, he went on to trace the origin of the drama to the love of imitation, and to point out its elements in the war dances of the savage tribes, and the representations of religious events which were common to almost all nations. Europe, however, owed her drama to Greece; and that circumstance had induced the lecturer to limit his remarks that evening to the Greek stage. The origin of tragedy, to which he should particularly refer throughout, was very simple, consisting only of a choral ode, accompanied by music and dancing, at festivals held in honour of Bacchus, and at the close of the vintage. Of these odes, some were grave and lofty in style, and these gave rise to tragedy; some less refined and more licentious, forming the precursors of comedy. The theatres of the Greeks were open to the skies; the performances took place in broad daylight, and no female actors were

allowed. The performances were a species of religious ceremonial; they commenced with sacrifices, and the professed aim of the author was to render amusement subordinate to moral instruction. Whatever the execution might be, the aim was noble. The requisite scenery of the ancient tragedies was extremely simple—the outside of a temple, a mansion, or a palace, or the interior court of either, sufficed for most of the incidents. The lecturer went on to describe the interior arrangement of the Greek theatre: the tiers of seats for the spectators of various ranks; the orchestra, or position of the chorus, identical with the modern pit; the altar in front of the stage, called the Θυμελη, a sacrifice to the gods upon which generally commenced the performances; the permanent stage, usually representing the front of a temple or palace; the scene, and the proscenium. He then explained the nature of the chorus, whose office it was to utter moral reflections or comments upon the action or the speeches of the characters, but never to actively interfere, although never permitted to leave the stage. They heard plots, but might not tell of them; witnessed crimes, but were not permitted to stop them.

PORTSEA.—On Wednesday sennight the first lecture of the season was delivered at the Watt Institute, by Mr. J. Spence, "On the Screw Propeller." The lecturer stated that not less than seventy claims had been registered for different modifications in the form of the screw. Among the most prominent was that by Mr. F. P. Smith, who was allowed the use of a steam vessel by the Lords of the Admiralty, for the purpose of making experiments, which were very satisfactory. Mr. Scott's patent, also Mr. J. Maudslay's, and the boomerang propeller of Sir Thomas Mitchell, were then alluded to, and the results of a variety of trials of each were given. The lecture was illustrated by a number of models.

ROYSTON.—On Tuesdays, the 22nd and 29th, November, two lectures were delivered at the Mechanics' Institute, by Mr. George Grossmith, on "The Recent Writings of Charles Dickens," and "English Notions of American Character." On both occasions the audience appeared highly delighted with the humerous and mimetic talents displayed by this popular lecturer.

SHREWSBURY.—On Tuesday evening, the 22nd ult., Mr. Elsmere delivered his second lecture on Botany and Vegetable Physiology, at the Shropshire Mechanics' Institution. The subjects of this lecture were:—The leaves, which were described as the lungs of plants—the circulation of the sap—the flower—the fruit. The lecturer next treated of the age of trees, and then took a glance at vegetation as it is found in the different parts of the globe, and concluded with some interesting observations on the study of nature. The lectures were both well illustrated with a large collection of preserved plants. A vote of thanks was unanimously accorded to Mr. Elsmere for his instructive lecture.

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Mr. J. Phillips, "On the Philosophy of Geology."
Entomological, 8.—Mr. A. R. Wallace, (continuation of a paper) "On the habits of the Butterflies of the Amazonian Valley."
Chemical, 8.

TUES. Horticultural, 2.
Linnæan, 8.
Civil Engineers, 8.—Mr. J. T. Harrison, "On the Drainage of the District to the South of the Thames."
Pathological, 8.

WED. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Society of Arts, 8.—Dr. Glover, "On Miners' Safety Lamps."
Ethnological, 8½.—1. Baron de Bode, "On the different races occupying the provinces of Asterabad and Mazanderan, on the southern shores of the Caspian Sea." 2. The Hon. Secretary, "On an Anglo Saxon skull exhumed by J. G. Akerman, Esq., from an Anglo Saxon cemetery, near Salisbury."

THURS. London Inst., 7.—Mr. F. Warren, "On the Cotton Manufacture."
Antiquaries, 8.
Royal, 8.

FRI. Astronomical, 8.
Philological, 8.

SAT. London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany."
Royal Botanic, 3¾.
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

From Gazette, 25th Nov., 1853.

Dated 10th November, 1853.

2601. J. Atkins, Birmingham—Ashpits for grates.
2603. Lieut. W. Rodger, R.N., 9 Stanfield street, King's road, Chelsea—Anchors.
2604. J. Stevens, Darlington Works, Southwark bridge road—Bearings of axles for gas meters.
2605. S. Mead Folsom, Massachusetts—Instrument for ironing clothes, &c. (A communication.)
2606. P. A. Le C. de Fontainemoreau, 4 South street, Finsbury—Preventing accidents on railways. (A communication.)

Dated 11th November, 1853.

2607. W. Parker, Birmingham—Bearings for machinery.
2608. S. Sturm, Carpenter's buildings, London—Machinery for optical lenses.
2609. A. A. N. S. de Montferier, Paris, and 4 South street, Finsbury—Rotary steam engine.
2610. E. G. Banner, Cranham Hall, Essex—Saddlery and harness.
2611. H. Walker, Gresham street west—Communication between guard and driver
2612. J. Willis, Wallingford—Buckles.
2613. R. Dryburgh, Leith—Holding staves whilst being cut.
2614. W. Steel, Glasgow—Machinery for washing malt.
2615. J. Pratt, Heldham—Machine for forging, drawing, &c., spindles, &c., in metal.
2616. H. Hilshaw, Birch, near Middleton, Lancashire—Spinning machinery.
2618. A. Easton, Barnard's Inn—Liquid for producing light.
2619. J. H. Dickson, Evelyn street, Lower road, Deptford—Preparing flax, &c.
2621. J. M. Levien, Davies street, Grosvenor square—Expanding table. (A communication.)

Dated 12th November, 1853.

2623. F. A. Délande, Paris, and 4 South street, Finsbury square—New metallic composition.
2624. H. Hilshaw, Birch, near Middleton, Lancashire, and R. Hacking, Bury—Spinning machinery.
2625. J. Gedge, 4 Wellington street, Strand—Consuming smoke. (A communication.)
2626. J. Gedge, 4 Wellington street, Strand—Metallic compounds. (A communication.)
2627. W. Austin, 27 Holywell street, Westminster—Manufacture of casks.
2628. T. De la Rue, Bunhill row—Paper manufacture.
2629. W. Austin, Holywell street, Westminster—Sewer trap.
2630. C. Busson, Paris—Finger-keyed musical instruments.

Dated 14th November, 1853.

2632. W. Hadfield, Manchester—Looms.
2634. H. Willis, Manchester street—Organs and free-reed instruments.
2636. M. Gray, Glasgow—Weft forks for power looms.
2640. M. Fitzgerald, Sorrel Island, Clare, Ireland—Communicating between parts of railway train.

Dated 16th November, 1853.

2650. J. Ellerthorpe, Kingston-on-Hull—Stopping railway train.
2652. J. R. and R. and J. Musgrave, Belfast—Hot air stoves.
2654. J. Ronald, Paisley—Fixing colours on yarns, &c.
2656. D. Pratt, Birmingham—Arrangement for raising thimbles.
2658. W. F. Greenfield, Ipswich—Communicating between parts of railway train.
2660. J. Bristow, Bouverie street, and H. Attwood, Holland street, Blackfriar's road—Marine boilers.

Dated 17th November, 1853.

2662. J. Clare, jun., 21 Exchange buildings, Liverpool—Manufacture of bar and sheet metals, and machinery for same, and application thereof.
2664. S. and S. V. Abraham, Lisle street—Communicating information to persons in charge of railway trains.
2666. J. Banfield, Birmingham—Railway signal.
2670. A. Hoffstaedt, Albion place, Surrey—Artificial ultramarine.

WEEKLY LIST OF PATENTS SEALED.

Sealed November 23rd, 1853.

1267. Auguste Edouard Loradoux Bellford, of Castle street, Holborn—Improved method of treating flax and hemp, whereby they are brought to such a state that they may be carded, spun, and woven by machinery, such as is now employed in the manufacture of cotton and wool into yarn and cloth. (A communication.)
1269. John Harcourt Brown, of Arthur's Seat, Aberdeen—Improvements in apparatus for bottling or supplying vessels with fluids.

1271. Henry Turner, of Wilson street, Limehouse—New mode of applying hydraulic power to windlasses, for weighing anchors, and lifting heavy weights.
1276. William Babb, of Gray's inn road—Improvements in the manufacture of hats, caps, and bonnets.
1288. Alexander Porecky, of Bishopsgate street Within—Improvements in the manufacture of umbrellas and parasols.
1311. Illingworth Butterfield, of Bradford, Yorkshire—Improvements in and applicable to looms for weaving.
1313. Ebenezer Nash, of Duke street, Lambeth, and Joseph Nash, of Thames parade, Pimlico—Improvements in the manufacture of wicks.
1330. William Green, of Islington—Improvements in treating or preparing yarns or threads.
1332. Richard Archibald Brooman, of Fleet street—Improvements in firearms. (A communication.)
1375. John Chisholm, of Holloway—Improvements in the production or manufacture of artificial manures.
1382. Thomas Russ Nash, of Leigh street—Improvements in filters.
1536. Noble Carr Richardson, of South Shields—Improved capstan.
1576. William Rice, of Boston, Lincolnshire—Improvements in harness for horses and other animals.
1618. Henry Bate, of New Hampstead road, Kentish Town—A new fire-escape, which he denominates the "Ignevador."
1688. Charles Goodyear, of St. John's wood—Improvements in spreading and applying India rubber, or compositions of India rubber, on fabrics.
1690. Charles Goodyear, of St. John's wood—Improvements in the manufacture of brushes and substitutes for bristles.
1731. Thomas Gray, and John Reid, both of Newcastle—Improved mode of manufacturing files and rasps.
1772. Benjamin Collins Brodie, Jun., of Albert road, Regent's park —Improvements in treating or preparing black lead.
2026. John Mackintosh, of Pall Mall—Improvements in breakwaters.
2079. Isaac Southian Bell, of the Washington Chemical Works, Newcastle upon Tyne—Improvements in the manufacture of sulphuric acid.
2094. Edmund Leyland, of St. Helens, Lancashire—Improvements in apparatus for the manufacture of sulphuric acid.
2208. James Smith, of Law Hill, Perthshire—Improvements in scythes.
2229. John Phillips, of Birmingham—Improvements in shaping metals.

Sealed November 25th, 1853.

1275. William Babb, of Gray's inn road—Improvements in the manufacture of hair trimmings.
1278. George Irlam Higginson, of Meeting house lane, Dublin—Improvements in machinery or apparatus for evaporating or concentrating liquids.
1279. Frederick Russell, of Regent's park—Improvements in raising windows, shutters, blinds, and similar appendages.
1282. Louis Auguste Deverte, and Charles Eck, of Argenteuil, near Paris—Improved machinery for combing wool.
1325. Joseph Brown, of Leadenhall street—Improvements of elastic spring beds, mattrasses, cushions, and all kind of spring stuffing for upholstery work generally; making them lighter and more portable.
1381. Benjamin Biram, of Wentworth, Yorkshire—Improvements in working and ventilating mines.
1513. Pacifique Grimaud, of Paris—A new aerogaseous drink, which he calls "Grimaudine."
1525. Charles Topham, of Hoxton—Improvements in apparatus for measuring liquids, gases, and other elastic fluids, and for regulating the flow thereof; which apparatus may also be applied to the obtaining of motive power.
1585. John Getty, of Liverpool—Certain improvements in ship-building.
2170. Edward Thomas, of Belfast—Improvement in the construction of looms for weaving.
2340. Nicolas Callin, of the Roman Catholic College of Maynooth—Means of protecting iron of every kind against the action of the weather, of rain, river, spring, and sea water, so that iron thus protected may be used for roofing, for cisterns, pipes, gutters, window-frames, telegraphic wires, for marine and various other purposes.

Sealed November 28th, 1853.

1312. William Smith, of Salisbury street, Adelphi—Certain improvements in the machinery for, and method of, making and laying down submarine and other telegraphic cables; which machinery is also applicable and is claimed for the making of ropes and cables generally.
1323. Alfred Whaley Sanderson, of Cable street, Lancaster—Improvements in preparing effervescing powders.
1340. Edward Wilkins, of Queen's road, Walworth—Improvements in pots and vessels for the growth and cultivation of plants.
1341. Alfred Hardwick, of Liverpool—Improvements in propelling vessels.
1350. Joseph Whitworth, of Manchester—Improvements in machinery for perforating or punching paper, card, and other materials.
1352. William Thorold, of Norwich—Improvements in the construction of portable houses, and in machinery for raising, moving, and lowering the same.
1378. Edward Blackett Beaumont, of Wood Hall, Barnsley, Yorkshire—Certain improvements in bricks and tiles.
1406. Henry Bernoulli Barlow, of Manchester—Improvements in machinery for spinning, doubling, and twisting cotton and other fibrous substances. (A communication.)
1493. James Worrall, Jun., of Salford—Certain improvements in machinery or apparatus for washing, bleaching, and dyeing fustians, beaverteens, cantoons, satteens, twills, and other textile fabrics.
1496. George Robinson, of Manchester—Certain improvements in apparatus for roasting and dessicating coffee, cocoa, and chicory.
1629. Jacob Brett, of Hanover square—Improvements in photography.
1874. George Deards, of Harlow, Essex—Improvements in lamps.
1962. Thomas Herbert, and Edward Whittaker, both of Nottingham —Improvements in warp machinery employed in the manufacture of purled and other fabrics.
2087. Robert Drew, of Bath, and John Bayliss, of Birmingham—Improvements in stay and other like fastenings.
2095. Thomas William Gilbert, of Limehouse—Improvements in sewing sails and other articles.
2117. Adolphus Singleton, of Manchester—Certain improvements in machinery or apparatus for grinding and setting doctors, used in calico and other similar printing machinery. (A communication.)
2179. Aristide Michel Servan, of Philpot lane—Improvements in distilling fatty and oily matters.
2218. Robert Brisco, of Low Mill House, St. Bees, Cumberland, and Peter Swires Horsman, of Saint John's, Beckermet, in the same county—Certain improvements in the preparation of flax and other vegetable fibrous substances.
2219. Moses Poole, of Avenue road—Improvement in the manufacture of pulp for papermakers. (A communication.)

Sealed November 30th, 1853.

1337. Hesketh Hughes, and William Thomas Denham, both of Cottage place, City road—Improvements in pianofortes.
1356. Hesketh Hughes, and William Thomas Denham, both of Cottage place, City road—Improvements in machinery for weaving.
1439. Joseph H. Penny, and Thomas B. Rogers, of New York—Improvement in the manner of constructing machinery for propelling vessels, and other machinery, which they term a crank propeller.
1445. Arthur Parsy, of Crescent place, Burton crescent—Invention of a revolving engine, to be worked by steam, air, gases, or water.
1534. Joshua Horton, Jun., of Staffordshire—Improvement or improvements in steam boilers.
1569. John Imray, of Lambeth—Improvements in obtaining motive power.
1634. James Parkes, and Samuel Hickling Parkes, both of Birmingham—Improvements in the manufacture of certain drawing or mathematical instruments; also in packing or fitting same in their cases; which said improvements in packing or fitting are also applicable to the packing or fitting of other articles.
1702. James Naylor, of Hulme—Improvements in lamps.
2110. Alfred Vincent Newton, of Chancery lane—Improved machinery for crushing and grinding mineral and other substances. (A communication.)
2188. Alfred Vincent Newton, of Chancery lane—Improved mode of constructing steam boilers; applicable also in part to the construction of condensers. (A communication.)
2239. Robert Brisco, of Low Mill House, St. Bees, Cumberland, and Peter Swires Horsman, of St. John's, Beckermet, Cumberland—Certain improvements in machinery for hackling flax, hemp, China grass, and other fibrous substances.
2249. Isaac Ambler, of Maningham, near Bradford—Improvements in preparing or combing wool and other fibrous substances.
2287. Henry Goddard, of Castle gate, Nottingham—Improvements in stoves and kitchen ranges.
2289. John Rubery, of Birmingham—Improvements in the manufacture of umbrella and parasol furniture. (A communication.)
2295. John Henry Johnson, of Lincoln's inn fields—Improvements in apparatus for compressing or rarefying air or other elastic fluids. (A communication.)
2311. Charles May, and James Samuel, both of Great George street —Improvements in joining the ends of the rails of railways

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietor's Name.	Address.
Nov. 26	3535	Portable Lever Boot Front Blocking Machine..............................	John Yates.....................	249 & 250 Whitechapel road.

Journal of the Society of Arts.

FRIDAY, DECEMBER 9, 1853.

THE PAPER DUTY.

The Council has taken the earliest opportunity, at the commencement of a new session, to collect and place in a concise form before the members of the Society and the Institutions in Union, the substance of the information which it has received on the subject of the Paper Duty.

The following considerations are urged by paper-manufacturers against the duty: 1st. That paper must be dried, to avoid paying duty on water. 2nd. That paper-making and printing cannot, from the interference of the Excise, be made a continuous process. 3rd. That the expense of employing hands, and of carrying out the Excise regulations, is added to the amount of the duty. 4th. That the duty renders it necessary to keep larger stocks, and to keep them longer than would be otherwise required. 5th. That the labels affixed by the Excise cause much trouble. 6th. That spoiled paper, instead of being sold, must be re-manufactured. 7th. That if an extra glazing is required, it can only be done without risk in London. 8th. That "re-sorting," if required, must be done in the presence of overlookers. 9th. That the manufacturer cannot make envelopes. 10th. That the receiver may lower the value of paper by frivolous objections to quality, which cannot be remedied, because the maker cannot take the paper back. 11th. That a duty on weight deteriorates the quality in proportion to the weight. 12th. That Excise superintendence hinders experiments, while there is a loss of duty when they are made and fail. 13th. That in "browns" the duty is nearly cent. per cent. on the value, and in cheap writing-paper two pence out of every seven-pence halfpenny, while, as the value of the paper rises, the duty becomes less oppressive. 14th. That the duty most limits the demand for those inferior kinds of paper where it would otherwise be greatest, increases the hardship of loss by bad debts upon them, and leads to frauds in the manufacture; that it also prevents the use of common papers in a variety of ways, curtails a manufacture well adapted for women in the rural districts, and checks an increased demand for printing. 15th. That the manufacturer is delayed seventy-two hours, thus rendering it impossible to execute orders for immediate delivery, and neutralising the advantages of quick railway transit. 16th. That ten per cent. is added to the duty by incidental expenses in carrying out the Excise regulations; and that penalties are incurred in thousands of cases, while very few are exacted. 17th. That the manufacturer is obliged to give unnecessary notices to the Excise to charge, and to adopt a system of having "dummies" charged, in order to surmount, in some degree, the delays and inconvenience which this duty unavoidably imposes. 18th. That to a certain extent the use of new materials is prevented in the manufacture. 19th. That small manufacturers are driven out of the field by the disadvantage at which the duty places them; and that they are obliged to accept any terms from the wholesale stationer who has capital. 20th. That the duty has to be paid immediately, while the customary credit in the trade is six months. 21st. That the manufacturer has only recently been brought in contact with the consumer, the larger number depending on the wholesale stationer for advances to meet the duty. 22nd. That the duty is submitted to as a protection not only against foreign but also against native competition. 23rd. That the duty is not paid by the consumer, being too small a proportion to add to the price, and that for common papers it falls very heavily on the producer.

The paper-manufacturers favourable to the retention of the duty, deny some of the above-mentioned statements, but do not enter into particulars. Their affirmative reasons for supporting the duty are: 1st. That it promotes order and regularity in a mill. 2nd. That the credit given for duty (two months), is an assistance in capital to the small manufacturer. 3rd. That the present price of paper is so low as to make further economy no object. 4th. That the removal of the duty would greatly increase the price of rags. 5th. That the public would derive little or no benefit from the reduction.

Wholesale stationers adverse to the retention of the duty represent: 1st. That being on weight it encourages consumers to use too thin papers. 2nd. That foreigners use paper for packing where it would not be thought of here. 3rd. That from the duty risk and the consequent hazard to mill property, the trade is becoming yearly more restricted to a few rich capitalists. 4th. That were the duty removed, we could undersell the whole world. 5th. That double profits are required at present to cover the trouble of recovering the drawback; and that small and frequent consignments abroad are prevented, while foreign makers can ship direct to the shopkeeper or consumer. 6th. That discrepancies between the weight and Excise marks of paper occasionally lead to disputes. 7th. That the chief importation of foreign paper is in extra thin bank post, where the duty is small. 8th. That the maker, agent, wholesale dealer and retailer, all have their profit on the duty, so that the consumer has to pay fully double the amount of it, and sometimes more.

The wholesale stationers opposed to the removal of the Paper Duty represent: 1st. That the drawback already gives a fair chance of proving what can be done in exporting. 2nd. That all

the cheap publications would remain the same price still, and the reduction on paper to any but large consumers be inappreciable.

As a class, the wholesale stationers are for the retention of the duty; and the explanation given of this is, that the manufacturers being in want of money to meet the duty are under their thumb, and are not allowed by them to sell directly to booksellers in London.

Manufacturers from paper, and manufacturers using it, bring forward the following considerations for the repeal of the duty: 1st. That the duties on papers used for manufacturing and commercial purposes, such as packing, is 260 per cent. heavier than on those for luxury or ornament. 2nd. That the duty presses very heavily upon the binding of cheap books, and enters into the price of tea and sugar. 3rd. That it depresses the fancy-box trade, wherein thin wood is substituted for paper. 4th. That the cost of paper is sometimes, weight for weight, four times the price of articles packed in it. 5th. That pasteboard-makers, paperstainers, printers, booksellers, and other trades, are injuriously affected. 6th. That in goods for export and otherwise, where large quantities are used in packing, and in the case of hot-pressers and calenderers disadvantages arise. 7th. That our manufacturers and tradespeople are prevented from setting off their goods as ornamentally as the French. 8th. That pasteboard-makers are shut out from making railway tickets and rough cards. 9th. That the duty seriously affects our silk manufacturers in the cards for their Jacquard looms, preventing them from competing successfully with those of France, not only in cheapness but in the variety and excellence of their designs. 10th. That the book trade with America is subjected to an unfair competition thereby. 11th. That foreign paper-boxes can be imported at a ten per cent. duty, while ours pay seventy or eighty per cent on the material. 12th. That the papier mache trade is greatly restricted, especially in barring the use of a material under one-quarter of an inch thick. 13th. That some firms of paperstainers pay 10,000*l.* a year in duty. 14th. That a paper-maker's cuttings are exempt from duty, while an envelope-maker's or manufacturing stationer's are not, though they amount sometimes from a ton to a ton and a-half per week.

No facts or arguments are brought forward by manufacturers from paper or manufacturers using it, that can in any way be considered favourable to the retention of the duty.

On the part of the publishers, for the removal of the duty, the following considerations are urged: 1st. That the duty enhances the price of all books, but of cheap books particularly. 2nd. That the burthen of the duty, as a book tax, is much increased by the charges of the middle men, &c. 3rd. That one reason for resorting to stereotyping is the risk of sinking capital in a large impression of a book on taxed paper. 4th. That the duty presses so heavily upon cheap works intended for large circulation as to absorb what would amount to a profit upon them. 5th. That it compels the use of thin paper upon such works, making an invidious distinction between literature for the few and the many. 6th. That it has greatly checked the production of reprints and serials. 7th. That it has hindered the public from obtaining easy access to works, the copyright of which has expired. 8th. That it contributes to the present system of limited impressions when new books are published. 9th. That it is a punishment by the Government upon an unsuccessful book, by becoming a tax on waste paper. 10th. That it has a tendency to encourage literary piracy. 11th. That its depressing effects upon popular literature includes school books. 12th. That it is a great hinderance to enterprise among publishers.

Publishers opposed to the removal of the duty suggest a drawback on unsuccessful books, and that the Society should offer a reward for a cheap process of bleaching printed paper and taking out the ink. They also represent that, if the duty were taken off the public would look for reductions which could not be made. They attribute the literary piracy which prevails exclusively to the effect of the present Copyright Act.

Newspaper proprietors favourable to the abolition of the duty urge: 1st. The perishable nature of newspapers, which increases the injurious operation of the duty upon them. 2nd. That there would, from this repeal, be a remission of 50,000*l.* a-year on the press, available for the employment of more talent, by which a better article would be supplied to the public. 3rd. That the duty contributes to keep dormant 25 per cent. of capital in their business. 4th. That objectionable advertisements would be rejected if there were more readers. 5th. That, without taxation, a newspaper might be published profitably at 1*d.*, or even at a ½*d.*

Newspaper proprietors opposed or indifferent to the removal of the duty represent that consumers would derive no benefit from a change, because the fraction gained could not be allowed in the price.

Authors in favour of the abolition of the duty urge: 1st. That it prevents the publication of works of profound science and literature. 2nd. That it eats into their profits, especially in the case of cheap popular literature. 3rd. That it tends to give capitalists a monopoly of the publishing trade.

The opinions of authors seem to vary considerably as to the importance, in their interests as authors, of having the duty repealed; but none of them defend it, except, perhaps, Mr. Charles

Dickens, who says that its removal would be a personal gain to him, "without any benefit to the heavily taxed public."

The Council having collected the foregoing body of evidence, with reference to the operation of this duty, cannot doubt that it is one which inflicts very serious injury upon the progress of our Arts, Manufactures, and Commerce.

A tax is indefensible which presses injuriously upon the manufacturing processes, the supply, and the varied uses of that material through which so large a portion of the business of life is transacted, by which the communion of mind with mind is so vastly facilitated, and to which, for the benefit of future ages, the past records of the world are chiefly intrusted. The Council has therefore determined to exert the influence of the Society in obtaining, at the earliest possible period consistent with State exigencies, the repeal of this duty. The Institutions in Union with the Society are also earnestly invited to consider this subject, and, if they approve of the course which the Council is pursuing, to cooperate.

FOURTH ORDINARY MEETING.

WEDNESDAY, DECEMBER 7, 1853.

THE Fourth Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 7th instant, HARRY CHESTER, Esq., in the Chair.

The following candidates were balloted for and duly elected:—

Allen, James.	Pilkington, James.
Bigge, Rev. Henry J.	Roddam, Jonathan.
Cox, Thomas.	Russell, George,
Egerton, Edward Christopher, M.P.	Russell, George Fitzjames.
Fisher, Cyril Jeddere.	Stafford, the Marquis of, M.P.
Gregson, Samuel, M.P.	Twining, Samuel.
Jones, H. Bence, M.D. F.R.S.	Winchester, William Henry, F.R.C.S.
Nevin, John.	

The following Institution has been taken into Union since the last announcement:—

313. St. Austell, Literary Institution.

Previous to the reading of the Paper, the Secretary called the attention of the meeting to a large number of specimens which had been received from the Imperial Printing-office at Vienna, produced by the process known in Germany as "Naturselbstdruck," and in this country as "Phytoglyphy," or the art of printing from nature. These specimens included every variety, botanical, geological, entomological, fossil, and fabrics. In the year 1851, Dr. Ferguson Branson communicated to the Society "An Account of a Method of Engraving Plates from Natural Objects," which was read at a meeting held on the 26th March in that year, and which was published in the Notices of Proceedings at the time. Dr. Branson only contemplated the application of the process to ferns, leaves, sea-weeds, and other flat plants. The method he adopted was to impress the object itself into gutta-percha, or other soft material, and then to obtain an electrotype from the mould. The novelty in the present process consisted in the use of lead for receiving the impression in place of gutta percha; and also in applying to the polished surfaces of minerals a weak acid, which acted with different degrees of intensity on the materials of which the mineral was composed, and so caused a greater or less indentation. The moulds from the fossils were taken by liquid gutta-percha. Specimens were also exhibited by Messrs. Bradbury and Evans, who are working the process in this country. Samples were exhibited from Dr. Forbes Royle, of cultivated Rheea fibre, from Assam, produced by Boehmeria Nivea, which was the plant which yields the Chinese grass, of which the fine grass cloth is made; also of the wild Rheea fibre. An account of this plant will be found at page 60. The Anglo-Franco-Algerian Vegetable Fibre Company also exhibited some specimens of jute, palm, and ditz fibres, in various stages of manufacture, prepared by Claussen's process. An account of these will appear in the next number.

The paper read was

ON A NEW SAFETY LAMP, AND THE INVENTION OF THE SAFETY LAMP.

BY ROBERT MORTIMER GLOVER, M.D., F.R.S.E., LECTURER ON CHEMISTRY AT THE ROYAL FREE HOSPITAL.

In offering the new safety lamp invented by myself, in conjunction with my friend Mr. John Cail, of Newcastle-on-Tyne, to the notice of the Society, it was at first my intention simply to present the lamp, with the shortest possible notice of the practical experiments to which it has been subjected, but as there are some matters connected with the history of the invention of the safety lamp with which I am particularly cognizant, I think it advisable, as this is the Society of Arts, to premise what I have got to say about the present invention with a few preliminary remarks.

The history of all inventions presents nearly the same character. It is rarely given to any one individual to at once excogitate a great fact. Whether we take the invention of the steam engine, or gunpowder (a), or the recent applications of anæsthetic agents in medicine, we shall always find a fact or great truth dawning dimly on the mind of some obscure observer, and gradually elaborated, and at last developed, by some one more fortunate than his predecessor. In these matters it is often as at the storming of a town, where the forlorn hope is

(a) I am prepared to prove that what *we* call the invention of gunpowder was merely the substitution of *solid shot* for the inflammable projectiles, such as the Greek fire, shot from copper tubes (cannon) by means of gunpowder.

sacrificed, and the rest of the army march through the breach with banners displayed. A recent writer on inventions has said, that "he invents who perfects." It is certain that this is the vulgar doctrine, and that whatever previous labour may be employed, or ingenuity exerted, the solid reward is always given to the individual who presents an invention in a practical form before the public. But it is not in this way that the merits of inventors should be judged. All who conduct a great discovery in the true paths of science should have their respective merits recognised, and a Society like this is especially the one to make amends for the deficiency of popular applause which the early labourers in any useful effort may have to lament, and which, I am happy to say, this Society did in the matter of the safety lamp. Dr. Clanny, the inventor of the first safety lamp, was, for many years, my most attached and venerated friend, and I am proud that I was the means, in his old age, of presenting him with a testimonial calculated to prove to him, with the gold and silver medals of this Society, that his services in the cause of science and humanity had not passed without some recognition. Questions with regard to the invention of the safety lamp are often urged and much misunderstood. The simple facts are these: Dr. Clanny, so far back as the year 1806, conceived the idea of a safe lamp to burn in mines. In the year 1813, a paper by him on the subject was read to the Royal Society, and published in the "Philosophical Transactions." Dr. Clanny's first lamp, although cumbrous, was quite safe. His plan was to insulate the light by means of water, and to supply the flame with air by a bellows. What I claim for Dr. Clanny is simply the original idea, and the merit of having commenced the work in the right spirit of scientific investigation, and to prove this I beg to refer to the fact, little known, that Sir Humphrey Davy, before the production of his wire-gauze lamp, proposed four others, all modifications of that of Dr. Clanny. At length his attention was drawn to the researches of Tennant, "On Flame." Tennant, of Cambridge, had discovered that flame would pass along tubes in a ratio compounded of their breadth and length. The smaller the caliber, the shorter would be the length that flame could traverse. Davy improved upon the idea, and with that happy and sagacious genius which belonged to this wonderful man, came to the conclusion that wire gauze was as it were an abstraction of this principle, and that here we had tubes of the shortest possible length, and narrowest diameter. Hence his invention of the safety lamp. But as the object of these preliminary observations is to do justice to all, it must not be denied that there is indisputable proof that George Stephenson, absurdly called by a biographer of Davy, *a Mr. Stephenson*, had, when a humble miner, ascertained the same fact practically; and it is also quite clear that these two great men knew nothing of each other's inventions.

The invention of the safety-lamp was hailed with a tumult of applause. It was not merely that it contributed to the safety of the miner—through it mines that had not hitherto been deemed capable of being worked for ages, could now be worked. The inventor of the safety-lamp was splendidly rewarded; and Mr. George Stephenson, too, presented with a sum of money, the foundation of his future fortunes. The only party who escaped remuneration was Dr. Clanny, the originator of the whole investigation, except from this Society. But after the invention of the wire-gauze safety-lamp, certain imperfections began gradually to reveal themselves. In the first place it was found to give so little light that the pitmen seized every opportunity of removing the gauze, finding, in point of fact, that their work could not be done with the imperfect light. And, in the second place, the great fact began to be developed, that this lamp, however secure in a still atmosphere, *was not safe in a current.*

Davy himself, with his profound sagacity, was not ignorant of the latter important fact. He convinced himself by experiments at a *blower* in one of Mr. Lambton's (Lord Durham's) pits, that, when opposed to a current of the gas of mines in rapid motion, the gas would pass through his lamp, and burn inside and outside, and recommended a tin shield for protection on the side from which the current came. Strange to say, this practical observation of his has been to all intents ignored practically by miners up to the present time.

A vicious mode of reasoning with regard to the causes of explosions appears to me to have prevailed with viewers on this subject. An explosion takes place: the inquest shows that all known causes of accident are excluded. The men were working with Davy's. A goaf had been tapped, or a blower; and the inference is that the Davy was not the cause of the explosion, all the Davy's being perfect as far as the evidence goes—simply because no one returned to tell the tale. Now in such a case, *by way of exclusion*, I should conclude *that it was the Davy*, just as Euclid proves that, no other point being possible, a certain point is the centre of the circle. Besides, in the South Shields report, positive evidence appears to be given of the insecurity of the Davy. The objections then to the Davy amount to these: 1st. deficiency of light; and, in a lamp, light is a great object. It would be easy to have a perfectly safe lamp, by passing the air through such an apparatus as is used in the safety jet of the oxy-hydrogen blowpipe; but then it would give no light. Davy's proposed shield, if it were known from what direction the blower would come, might be safe; but as that cannot be known, according to the inventor's own admission, to make the Davy safe *there should be a shield all round*. It may further be observed, that deficiency of light is deficiency of safety, as it leads to candles being used where lamps ought to be used.

An account of the various attempts made to remedy the defects of the Davy, viz., insecurity in a current and deficiency of light, would fill a volume. As far as I am aware, the only lamps that have to any extent superseded the Davy, are the Clanny and Müseler lamps.

Dr. Clanny did not abandon his efforts to improve the

safety lamp with the discovery of the Davy; he never believed the Davy safe, and produced in succession several lamps. At length he found that if the lower part of a lamp were made of thick glass, and the wire gauze cylinder retained above this, two things arose: 1st. the current of air descended to feed the flame in converging curves, and the gaseous products of combustion ascended in diverging curves, so that there was a double current, which prevailed in the whole cylinder. This double current he contended rendered a lateral current less likely to pass through; and, 2nd., owing to the use of the glass, the gauze being no longer required to give light, could be made much finer, or even doubled and trebled. The Müseler lamp differs from the Clanny only in having a chimney in its interior just above the flame. The simplicity of the Clanny lamp, and the excellent light it affords, have brought it into extensive use. The pitmen, who are very careless of their Davys, and in fact appear in some instances almost to delight in injuring them, are very careful of their Clanny lamps; and as far as I am aware, no accident has yet occurred from their use. But there are two objections to the Clanny lamps, viz., the liability of the glass to fracture on being heated, from a drop of water falling upon it in this state, and also its liability to fracture from mechanical causes. The latter objection has been grossly exaggerated. The glass can be made so strong, and is so protected, as to be little liable to mechanical injury; nor in this respect is the wire gauze of the Davy beyond objection. Shortly after the invention of the lamp now produced, I was conversing with one of the most extensive viewers in the north, when a government inspector of mines joined us. The viewer asked the inspector what he thought of the new lamp. The latter replied that he only objected to the glass. The viewer said, "Why it is safer than gauze!" meaning mechanically safer. But the liability to fracture from water falling upon the heated glass is a serious objection, and one which has been felt in practice.

To remedy these defects as far as possible, the present lamp has been invented. Instead of the single glass cylinder of the Clanny lamp, a double cylinder is used. The outer cylinder is a quarter of an inch thick, the inner one a good stout glass, a full eighth of an inch thick. The air to feed the flame enters at the top of both, through wire gauze and passes downward between them, entering the inner cylinder through gauze. The double cylinder, kept packed as it were together by the gauze, is thus much stronger than a single one would be, and the double cylinder is a double protection, as if either cylinder be broken the lamp is still a safe lamp, and there would be time at least to remove the lamp and replace the injured cylinder, which could easily be done, all the glasses for the different lamps being of the same gauge. The current between the glasses keeps the outer cylinder cool, so that it can always be held in the hand, while a Müseler or Clanny soon gets so hot that it would burn the flesh. The light is even superior to the Clanny, owing probably to the more perfect combustion, the air entering the inner cylinder at the bottom. In the interior of the wire gauze cylinder is placed a tin cone; the object of this is to force the air to enter the lamp through the two glass cylinders, and so to regulate the supply of air as to make the lamp *self-extinguishing* in an explosive mixture. The wire gauze could be done without, and a tin or copper tube substituted with holes at the top, as in the Eloin lamp; but in practice we find such a tube get hot; and it is thought that it is an advantage to have the whole lamp as cool as possible. Strange to say, the most extensive viewer in the north of England, who long refused to admit any insecurity in the Davy, now advises that all gauze should be done away with in this lamp! We, however, do not see the reason, believing in the report of an eminent viewer to us on the subject, in which he states that our lamp unites the maximum of light with the maximum of safety. I hold very elaborate reports from Mr. Reid, viewer of Pelton, Mr. Armstrong of Haswell, and others; but as the lamp has been publicly tested, and evidence given on the subject before the House of Commons, I prefer referring to their reports. Thus Mr. Wood states the results of some experiments made in Killingworth pit. By an ingenious contrivance the lamps were made to revolve in a current of gas, so as to be brought to a white heat, then water was thrown upon the glass lamps. Under this severe trial almost all the lamps passed the flame. Respecting the present lamp, he says, "I tried Dr. Glover's lamp. . . . I subjected that lamp to a considerable velocity; we could not produce a white heat, and the flame did not, therefore, pass; it went out, although the wire gauze was much longer and of larger size than that of some other lamps which I had exploded; but I attribute this to the chimney in the inside of it diminishing the area of wire gauze and burnt air for the wick, casting down the explosive mixture within the gauze. I am, however, of opinion that the construction of this lamp may be improved, as I see no reason why the insecure gauze should be placed on the top." So the vaunted security of wire gauze is abandoned for ever! He further says, "In my opinion, Dr. Glover's lamp is likely to be a very useful one." He goes on to say, that when the lamp was thus intensely heated, more so than is possible except in an actual explosion in a mine, water thrown upon it (which, of course, cracked all the glass lamps), *only cracked the inner cylinder.* This is the most decisive test of the success of our plan, because we do not expect the inner cylinders to be kept cool. It is, moreover, little exposed to water; but if, under these circumstances the inner cylinder was cracked, it was not injured so as to be unsafe, and the outer thick glass was safe; the whole lamp being still safe, the success of our plan in every respect was perfect. Again—in answer to the question: "At present your opinion is that Dr. Glover's contains the two principles of giving the greatest quantity of light and the greatest safety, more than any other lamp that you have seen?"—he answers: "I think Dr. Glover's is the best lamp of that construction I have seen." Mr. Forster states that he thinks Dr. Glover's is the best lamp. On the other hand, Mr. Mackworth thinks the lamp "very safe and ingenious," but objects to its weight, the fact being that it is ten ounces lighter than the Clanny. And Mr. Henderson, the inventor also of a safety lamp, considers that there is a difficulty in uniting the gauze so as to prevent the flame passing. What he means I do not profess to understand. I have only to add that the lamp is now in pretty extensive use.

DISCUSSION.

In reply to the Chairman, whether any gentleman wished to address the meeting on the subject,

Mr. Glynn said he had listened to the paper with great interest and pleasure, as it so happened he was intimately acquainted with the early history of miners' safety lamps, more especially that of the late George Stephenson, who was for a long time engaged in experiments in endeavouring to shorten the tubes. About that time Sir Humphry Davy produced the best lamp that had been seen, it being an improvement on that of Dr. Clanny; the object was that the light might be fed with air, without coming sufficiently into contact with it to cause an explosion. Mr. Stephenson shortened the tubes, and made his lamp of a glass cylinder, with brass ends, perforated with small holes,—it being considered a great desideratum to get as good a light as possible. Sir Humphry Davy's was made with the wire gauze, which was found to be quite as liable to fracture from mechanical causes as the glass, whilst the flame would occasionally come into contact with the foul air and produce an explosion. Indeed, every one knew the miners were very reckless, and would open their lamps, or incline them, so as to bring the flame to the side, for the purpose of lighting their pipes, by which many accidents were caused. Dr. Glover's lamp appeared to him to go a long

way to prevent this. It was highly important to have a good safety lamp, as otherwise many productive mines could not be worked. His recollection went back to the time when the miners were guided in their operations by the light of a steel mill—a disc of steel, worked by hand, in revolving struck a series of flints, throwing off sparks of fire. He felt they owed a debt of gratitude to Dr. Glover for his lamp, as indeed they were to any one who could enable them to work deep and dangerous mines with comparative safety.

Mr. Martyn Roberts did not see that Dr. Glover had properly provided against any accident arising from the fracture of the glass. He regretted that he had not known of the meeting in time to bring one of his own lamps, which he had submitted to Mr. Nicholas Wood, the coal viewer. It was composed of a double cylinder of glass, the chamber between which was filled with water. Within was a trigger, attached to an extinguisher, so that when either glass broke the water acted on the trigger and put out the light. With the exception of the objection he had taken, he considered Dr. Glover's a most valuable lamp.

The Chairman asked whether if a man attempted to light his pipe it would put out the flame?

Mr. Roberts replied certainly it would.

Mr. Biram had listened with great attention to the remarks of Dr. Glover. He had great pleasure in meeting the Society, and in submitting to it a lamp of his own invention. His attention had been drawn to the fact that Sir Humphry Davy's lamp could not be carried through confined air with velocity without danger from the current; and also to the necessity of giving as much light as possible. He therefore reflected it through glass with the exception of a small portion in front of wire gauze, and by these means he had obtained four times the light of a Davy lamp. There was a funnel through which the air passed down the chimney, which was fastened on with a bayonet joint to make it secure; and at the top there was a perforated copper tube so that no flame could get to the air. As soon as the lamp was brought into an explosive atmosphere, the gas and oxygen would burn together, and immediately the lamp was removed the light would go out. An objection had been made to the lamp that it was so large that it was likely to explode; but he did not think that that objection would at all hold good. He should be happy to submit his lamp to any test to which any other might be or had been submitted. He knew that it was capable of improvement. It was destitute of the pricker of Sir H. Davy's, which, however, might be easily added so as to enable them to lock the lamp and to make it perfectly secure.

Mr. Johnson had received a communication from Mr. T. Y. Hall, of Newcastle, relative to his newly invented safety lamp. The principal improvements of this lamp consisted in obtaining a better combustion with an increased light, by the admission of air at the top of the lamp, and the adaptation of an improved form of chimney. It would also cause a diminution of liability to explosion, by the adoption of gauze in combination with glass, and the use of double gauze where the air was admitted. The air was admitted by an aperture at the top, passing down between the gauze and the inner chimney or tube into a chamber, from which it was admitted to the light; or it might be admitted in the same way from the bottom. The lamp might be fed with hot oil, whereby less of it was consumed, whilst an increased light was obtained. Mr. Hall had also patented the application of the Dioptric lens to lamps of this description, by which the brilliancy of the light would be still further increased.

The Chairman said, if no one had any further observations to make, he would move that a vote of thanks be given to Dr. Glover for his interesting communication. It was a subject of great interest, on which he should like to have heard a little more discussion, but, as the paper would be printed in the Journal of the Society, probably it might yet elicit further information relative to it.

The motion having been carried—

Dr. Glover returned thanks, and said that, with regard to the protection of the lamp from mechanical injury, he had explained that it consisted of a double cylinder, and that it would go out in an explosive atmosphere. He had not spoken at length of all the testimonials contained in the parliamentary papers, but in every test to which it had been put, the lamp had been found to answer its purposes.

The Secretary announced that at the meeting of Wednesday next, the 14th inst., Mr. I. J. Mechi would make his "Third Report on the results of his experiments at Tiptree Hall Farm." Also that, in consequence of numerous applications, the Council had determined to hold an extraordinary meeting, on Monday, the 19th inst., at Seven o'clock, p.m., precisely, for the purpose of resuming the discussion "On the Consumption of Smoke, when it was hoped attention would chiefly be directed to the difficulties which the furnaces employed in various trades and manufactures imposed to the application of this plan, and how far these difficulties might be overcome.

BERDAN'S GOLD MACHINE.

In consequence of the difficulty of getting together, at a short notice, the Standing Committee on "Mining, Quarrying, Metallurgical Operations, and Mineral Products," the Council accept, with thanks, the following Report from Professor Ansted, F.R.S., one of the members of that Committee.

Sir,—Before receiving your letter, and indeed before I was aware that a paper on Mr. Berdan's machine was in preparation, I had myself made an experiment on the machine which, owing to some causes I need not mention, seemed incomplete. A partial trial had also been made in the presence of some Directors of the Agua Fria Company, on some tailings belonging to Mr. Catherwood, and a further trial was proposed by me to be made, at the cost of the Agua Fria Company, for the purpose of determining with something like accuracy the positive and relative value of the process. On receiving your letter, I made an arrangement with Mr. Berdan to carry out our investigation on Monday, the 28th ultimo, and the trial then made became at the same time available for the Society and the Company.

The experiments consisted of, 1st, the crushing and amalgamating of certain Californian ores, provided at my request, by the Directors of the Crystal Palace Company. 2nd, the crushing and amalgating certain ores from North Devon, provided also at my request by the Directors of the Poltimore Mining Company, and, 3rd, the ultimate analysis of tailings from each sample, conducted at the cost of the Agua Fria Company, by T. H. Henry, Esq., F.R.S. I had also provided other samples of ore from North Wales, and some tailings resembling those already previously but partially experimented on by Mr. Catherwood. These have not yet been operated on and analysed.

In order to obtain results as complete and satisfactory as possible, the machine was placed by Mr. Berdan at my absolute control, and the feeding was entrusted to two labourers, hired for the occasion, and who had never seen the machine. Owing to the latter cause some delay occurred in feeding, doubtless unfavourable to the machine. I was assisted in the investigation by Mr. Henry, who himself collected the tailings, and conveyed them to

his laboratory. I had also the able assistance of Mr. J. S. Atkinson, a civil engineer well acquainted with machinery, to whom I am indebted for a careful report on the power employed during the experiment, and who has assisted me also in obtaining an estimate of the probable working and general charges incidental to the use of the machine and engines required to work it.

Before commencing the experiments the basins, mercury reservoir, and pit for tailings, were thoroughly cleaned out. Fresh mercury (about fifteen pounds) was put into each basin, and about 288 lbs. of mercury in the reservoir. It was observed that the gauzes through which the tailings pass away from the basins were in very indifferent condition, being partly cracked and otherwise injured. During the experiment one of them was broken off, and the fragments mixed with the amalgam.

Experiment 1.—All preliminaries having been completed, the machine was started, and about half a ton (10 cwt. 1 qr. 23 lbs. nett), of very hard tough auriferous quartz, from Gold Hill, Nevada County, California (now in the possession of, and being worked by, the Agua Fria Company), was gradually supplied by hand, one half in each of the two basins of the machine.(a)

The whole time of feeding was 1 hr. 24 min. (exclusive of a stoppage from over-feeding, owing, apparently to the want of experience of the feeders). After the feeding was concluded, the basins were kept revolving for 25 min., and there still remained a considerable quantity of sand at the close of the operation. The arrangements for removing the plug and emptying the basins occupied 49 min. During the experiment, while the mill was in full operation, the average number of revolutions of the basins was 19 in the minute, and the average quantity of water delivered in each basin was 10 to 11 gallons per minute. On a careful estimate, the average power absorbed in working the two basins appeared to be 11·835 commercial horse-power, but probably nearly one-and-a-half horse-power was lost by the vibration of the cross beams which have no bracing. In this experiment, the quartz was extremely hard and tough, but was ground to a very fine powder. The amalgam being obtained from the mercury and reduced, yielded 2 oz. 11 dwts. 21 gr. of gold, whose fineness was 20 carats 3¼ grs., equivalent to 4oz. 4 dwts. 21 grs. fine gold to the ton of ore. On an ultimate analysis of the tailings they were found to yield at the rate of 4 dwts. 5 grs. of fine gold to the ton, the machine obtaining, therefore, 95·8 per cent. of the total amount of the gold contained in the ore.

Experiment 2.—The basins being perfectly clean and the mercury again placed in them, a quantity amounting to 8 cwt. 12 lbs. nett of the red oxide of iron, combined with some sulphuret, forming the gossan of the copper lodes at Poltimore, North Devon, was submitted to be crushed; one half, as before, in each basin. This ore was much less hard than the Californian, and was partly in small lumps, partly in a red, soft, muddy state. It was a portion of about one ton, forwarded expressly from the mine to my address, for the purpose of experiment. I did not observe any visible gold in any part of the ore. The time occupied by the feeding with this ore was 29 min. 30 sec. from first to last; the mill being kept going for 23 min. 30 sec. after the feeding, after which the quantity of sand was not very considerable. The removal of the amalgam occupied 1h. 23 min. During this experiment, the mean number of revolutions per minute was 19 *full*; the power absorbed being 12-horse, as nearly as could be estimated. The water was as in the former experiment. The springing of the cross beams was very marked. The ore in this case was ground finer than in the former, remaining a long time mixed with the water before subsiding. The amalgam being reduced, yielded at the rate of about 1oz. 12½ dwts. of gold to the ton of ore. The gold was apparently finer than the Californian, but the button was not assayed nor was its weight accurately taken. The tailings of this ore yielded at the rate of 2 dwts. fine gold to the ton of ore, the per centage of gold obtained by the machine being 93.

In a former experiment it was determined, by analysis of the tailings, that the loss of mercury is extremely small. It appears likely that this loss does not exceed in weight that of the gold obtained.

The machine, in its present state (although certainly admitting of some improvements), is both simple and effective, and although the basin and balls would probably require frequent replacement, it is not likely to get out of order. It requires no skilled labour, and might be entrusted to any responsible person altogether ignorant of gold working, and in this respect its advantages over any machine or process in actual use are equally certain and important. The per centage of gold obtained is decidedly very large, and from the near equality of this per centage in two ores, extremely different in nature, richness, and hardness, it would seem that the machine may be generally and safely employed on ores of average value where the yield of gold is large enough to leave a profit on the cost of working.

We have next to consider the probable charge for working the machine. For this purpose it is fair to take the combination of four basins recommended by the inventor, assuming the first cost and subsequent expenses under the least favourable circumstances. Such a combination I assume to require an engine of 25 horse-power, and to work continuously, except when stopped for repairs or delivering the amalgam. Under these circumstances it may fairly be considered that 16 tons of average stuff might be reduced per day by this machine in England or Western Europe, at an average cost of 13s. 9d. per ton. In California the cost would hardly exceed 20s. per ton. I make no remark on this result, which will speak for itself to all those interested in gold working.

I append the details, 1st, of the estimate of power absorbed during the experiment; 2nd, of the estimate of cost of working in England.

Yours, &c.,

(Signed) D. T. ANSTED, Reporter.

To the Secretary to the Society of Arts.

(a) This ore was part of a large quantity (about 100 tons) sent over by Mr. Catherwood about two years ago as a fair sample of Gold Hill quartz. There was barely a trace of gold visible in any part of the original cargo, and the portion employed on this occasion was selected as including the smaller specimens of ten tons, purchased a year ago for the Crystal Palace Company. These had been broken by hand, at Sydenham, to about the size of a hen's egg.

Appendix 1.—*Calculation of Power.*

The drum on the mill, 2 basins, measured 5 ft. diameter (15·70 circumference), and made 93·6 revolutions. The strap was 6 inches, and the pressure of strap, per square foot, being 150 lbs., the area of strap, effective, was 3·5 feet. We have, therefore,

$$\frac{3\cdot5 \times 150 \times 1469\cdot52}{33{,}000} = 23\cdot67 \text{ horse power, estimate.}$$
$$= 11\cdot835 \text{ commercial horse power.}$$

The power was somewhat greater in the second experiment the revolutions being somewhat more rapid so that the actual power could not have been much short of 12-horse. In both cases 1½ horse or thereabouts was wasted by the springing of the cross beams and imperfections of connecting parts, so that 10½ might suffice. It would not, however, be safe to put a less power than 12-horse for a single pair, or 24-horse for four basins, and a slight excess of power would be desirable for pumping water, lifting ore, &c.

Appendix 2.—*Estimate of Cost and Charges.*

Plant.—Cost of a nest of 4 basins	£2400	
Conveyance to mine, foundations and fittings, house, &c.	300	
		£2700
Cost of a 25 horse-power engine, complete	1250	
Engine and boiler house	150	
		1400
Sundry incidental charges		100
Total cost of Plant		£4200

Annual Charges.—Deterioration and replacement of machine, 60 per cent.	£1440			
Ditto, ditto, of engine and fittings, 10 per cent.	150			
Interest on cost of plant, at 5 per cent	210			
Total Annual Charges	£1800			
Daily Charges.—Proportion of annual charges on each working day		£6	0	0
Wages and salaries per day (working day and night)		2	10	0
Coal, 2½ tons, at 15s.		1	17	6
Oil, waste, tallow, tools, and sundries		0	2	8
Loss of mercury and proportion of laboratory expenses		0	4	6
Spalling or crushing 16 tons, at 4d. per ton		0	5	4
Average daily charges ..		£11	0	0

The four basins, crushing and amalgamating not less than 16 tons on an average per working day, the mean cost would thus be 13s. 9d. per ton. This cost might be diminished by the introduction of a hopper (avoiding a heavy expense in wages), the combination of two or more nests in one establishment, and any improvements that would lower the annual deterioration of the machine.

ON THE COTTON PRINTING PROCESS OF TATTAH.

BY LIEUTENANT C. J. STEUART, ASSISTANT-COLLECTOR IN SINDH.

THE following account of the native processes of calico printing in Sindh, by mordants, by resists, and by discharges, with the materials employed, and other particulars as to the trade, is taken from a letter forwarded by the Court of Directors of the East India Company to the Commercial Association of Manchester; to whom a box, containing the patterns of printed cloths, the implements used in the process, and the various dyeing materials alluded to have also been sent.

The art of cotton printing, as practised among the natives of Sindh, is confined to two methods, which may be described as follows:—The first is that of printing by means of mordants, the principle of which appears to have been understood in India long before it was introduced into Europe; the second, of printing by means of resists, or resist pastes, the action of which is to protect from colouring matter those parts of the cloth to which they may be applied. There is also another method of printing by discharges; that is, by applying to those parts of the pattern which are to be kept colourless, some substances which will neutralise the effects of the dye in which the fabric may be immersed hereafter; or which, by themselves combining, after the manner of mordants, with certain of the colours already imparted to the cloth, add intensity and variety to them, while they neutralise and destroy the others. It is evident that the successful application of this latter branch of the art, requires an amount of scientific and chemical knowledge which is not, as yet, possessed by the natives of Sindh, or of India generally; and the natural result is, the great want, which is apparent in all the patterns produced by them, of any but the more positive colours, and the absence of those beautiful half-tints, such as pinks, olives, drabs, violets, &c., with which the English calico printer varies and adds value to the brighter dyes. A few words before proceeding to describe the process of cotton printing, as practised at Tattah, and I believe generally throughout Sindh and India, may be added regarding the materials employed, and the specimens that accompany this memorandum, together with those showing the progressive stages through which the cloth passes, will give a very good idea of the implements with which the Sindhee works, and the result he produces by their means.

The cloth, it will be observed, is a coarse variety of long-cloth, and is known by the natives as bafteh. The length of the nap, or floss on it (for the removal of which no means appear to be in use), is of course a great drawback to any of the minuter patterns being applied successfully to it; and thus, at the very outset, the Sindhee labours under a difficulty which nothing but the most skilful arrangement by the application of the fabric over the heated surface of an iron cylinder can, even in the hands of an English workman, remove.

The cloth is prepared for receiving the mordants in the following manner, and the composition of these, as forming the next material in use, will be given hereafter. Having been previously washed in a mixture of potash, camel's dung, and water, it is dipped in a lye, composed of oil (a), (in the proportion of one seer of oil for each piece of 20 or 25 yards to be printed), potash and water, and allowed to stand for four or five days; after which, having been throughout washed in clean water, it is placed under a heavy weight, and is then again soaked in water, and beaten out by the feet. This operation is repeated four times, and the cloth having been exposed to the sun, is dipped in a mixture made as follows:—To a quarter seer each of sakoon (b), hulleleh, and the flowers of the tamarisk, ground down to the consistency of coarse flour, as much water is added as will render the mass sufficiently liquid to soak the whole piece of cloth, which, on being saturated with it, assumes a faded yellow appearance, and is then fitted for the reception of the mordants.

It is to the imperfect knowledge possessed by the natives of procuring a variety of colours by varying the mordants in use, that the poorness of their patterns may be attributed; but as in the silk-dying process, alum enters largely into the composition of those with which they appear to be best acquainted. For stamping the red colour, the proportions are a seer of gum and a quarter seer of alum to four seers of water, to which ingredients is added as much red meth as will render the whole of the consistency of thin paste,—a consistency which is necessary in order to prevent the mordant leaving the pattern or figure which is to be stamped. The other mordant in use—which might, perhaps, with greater propriety be included under the head of colours—is made by dissolving rusty iron in a liquor composed of coarse sugar and water; the gradual fermentation of which, no doubt, produces the same effect as that which is obtained elsewhere by vinegar. To ten seers of this iron-liquor are added twenty seers of water, and the mixture is allowed to stand in an earthen pot for fifteen days; after which, as much of it as may be required for immediate use is thickened with gum, and the red meth alluded to above. This latter substance takes the place of pipe-clay, as is usually employed in England, and is an oxidised variety of the earth known throughout Sindh by the name of "Mooltanee muttee."

The cloth having been prepared, as shown above, to receive the mordants, the application of these, by means of wooden blocks or stamps, forms the next portion of our subject. These stamps are generally made of the wood of the Lohero tree (*Bigonia undulata*), which, though sufficiently hard, yet does not possess the closeness of grain or clearness of cut which is necessary even for the coarser kinds of wood engraving. It appears to be very well adapted, however, for the purpose to which it is almost exclusively, I believe, applied by the Sindhee. Babool is also used in making the stamps; but it is found not to be quite so lasting as the Lohero. The block of wood from which the stamp is to be made, having been planed aud ground

(a) Generally that made from the jhamba, or sursoon; a mixture of both is considered preferable.

(b) Sakoon, the gall of the tamarisk, or jhow, *tamarisk indica*; hulleleh, fruit of the *terminalia belerica*, not indigenous to Sindh, but grows in the Deccan; koongotareh, native name for the tamarisk flowers.

to a level surface on a stone, with sand and water, is rubbed over with a little liquid meth, in order that the pattern to be marked out may be plainly distinguished on it. This is then drawn out by means of the rude pencil,—commonly a piece of charcoal—and still ruder compasses (see the specimen forwarded), and the intermediate spaces having been cleared away by the larger chisel, the finer parts are cut out with a small instrument, of which upwards of thirty are required for the various purposes of cutting, clearing, and punching holes, where it is intended that the mordant, or in other cases the colouring matter, for the stamps are used indifferently for both, should not have effect. A set of about thirty-seven blocks, the largest number employed for any one pattern, is made in a month, at a cost price of about 4½ rupees, and the block engravers are generally attached to the printing establishment; there are not more than three or four men in Tattah employed on this work. To return to the blocking or printing process, this is performed by an operator who sits in front of a small wooden board, raised on legs, and covered with two or three folds of cloth, or Numdah, on which is spread the bafteh prepared in the manner already described; near him are placed shallow, earthenware pans or trays, containing the mordant which has been mixed up to the consistency of thin paste, and is presented in a form suitable for transfer to the surface of the blocks by being soddened on a piece of rag immersed in the pan. This has much the same effect as the sieve which is usually employed by English calico printers, though the latter is certainly the more effectual method of preventing the block receiving more than the thin upper coating of mordant which is necessary for the impression of the pattern. The red mordant is generally the first to be applied, and this the operator does by impressing the block which has been previously dipped into it, on the surface of the cloth, and then striking it on the back with his hand, in order to secure a perfect impression, and repeating the operation till the entire surface of the bafteh is covered with such parts of the pattern as are intended to be red. In the same manner the black mordant or colour is applied, and the cloth assumes the appearance which may be seen in specimen No. II. the red colour looks dull and dirty, and the black more nearly resembles brown or rusty purple. The cloth, covered as it is with impressions of the red and black mordants (care being taken that these be quite dry), is well washed in hot water, in which camel's dung has been infused. It is then soaked in cold water, rinsed, and at once transferred to the dyeing bath of munjeet or madder, where it is allowed to remain four or five hours. When taken out of the munjeet bath, the whole of the pattern is in confusion (ghurbar), the red colour having been suffused throughout, and it is only after being washed in water and camel's dung, and subsequently with potash and soap, the operation being repeated for five or six days, that it presents the appearance which will be seen in pattern 3. Those portions of the pattern which have received the mordants appear bright and distinct, while the ground has lost the faded yellow colour it had at first, and is now as nearly white as it can be made in the hands of native practitioners. The next operation is the application of the resist paste to such portions as are not intended to receive the remaining colours of the pattern. The composition of the resist paste is as follows:—A seer of gum, with one seer of chunam, which has been mixed with water to the thickness of cream, are dissolved in four seers of water, enough meth being added to render the whole sufficiently thick to remain on the surface of the blocks without running. It is then applied with the same blocks which were used for imparting the mordants to those parts (in this instance red) which it is intended to protect from the action of the dyes subsequently added, powdered cow-dung being sprinkled over the surface for the purpose of drying the resist paste. The cloth is now ready to receive the ground colours, of which the varieties are usually very limited. In the pattern before us, the number of these is four, and they include all that are generally employed. They are made as follows:—

Yellow.—An infusion of pomegranate bark is made by steeping a seer of this substance in hot water, to which is added a quarter seer of turmeric, and a small quantity of phitkee or alum. No gum is used, as in making the mordants.

Green.—For the green colour a little indigo is added to the above mixture.

Light Red, or Salmon, Colour.—This is made of munjeet or madder root, ground to a course powder, resembling saw-dust, and mixed with water.

Blue.—A weak infusion of indigo, when the whole groundwork of the pattern is to be dark blue (as in the rezaees) the same resist as is applied in the former case having been stamped when required, the fabric is then dipped in the indigo vat

All the above colours are roughly dabbed in with a bit of rag or cotton, and the operator, not been very particular as to the carefulness with which is work his done, many of the minuter portions of the pattern, such as leaves, sprigs, &c., are coloured with the rest, and have to be stamped in afterwards with blocks; these portions are occasionally pencilled in, in England, with a camel's hair brush, but I cannot find that a similar process is adopted in this country. The cloth is then boiled in water, to which a little alum has been added, and having been subjected to various washings and rinsings, each colour assumes its proper tone, and the cloth is ready for wear: see Specimen No. 5.

In conclusion, a few words may be added regarding the statistics of the trade. The number of shops where this process is carried on in Tattah, is 15. Five are conducted by Mussulmans and ten by Hindoos. The number of men who find occupationin the former is 23, and in the latter 40. Women are not employed in the trade. The usual rate of payment is from four to six annas per diem, according to the ability of the workmen. The blockmakers have already been treated of. The printing of a rezaee, from beginning to end, occupies about 20 days.

ON RECENT IMPROVEMENTS IN CHRONOMETERS.

BY E. T. LOSEBY.

(*Continued from page* 38.)

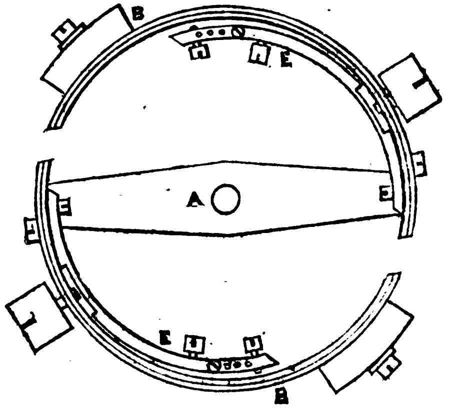
"With reference to the first point, it has been found by a great number of experiments and trials, extending over a period of ten years, made at the Royal Observatory, Greenwich, and elsewhere, that the law of loss of elastic force in the spring requires 1-45th of the entire compensation to increase over the effect produced by the compound lamina, in the progression shown on the diagram,

Fig. 1.

where it may be observed that the advance, which at first is small, gradually accumulates throughout. Keeping in mind, therefore, the rate of increase that is required in the motion of the weight, the methods that have been proposed for removing the defect will now be examined. These may be divided into two classes; the first class which will be noticed was introduced by Mr. Eiffe, to whom we are indebted for having pointed out the defective part of the old construction and made it more generally known, although it is stated that Berthoud, Arnold, and other eminent horologists of the last century, were familiar with the defect. In a work published at the instigation of the Board of Admiralty, in 1842, several of Mr. Eiffe's plans are described; one kind acting upon the balance-spring, the other connected with the balance. Of the plan acting upon the balance-spring, it will be unnecessary to say anything further than to observe that any appendage having a variable mechanical bearing upon the balance-spring will destroy the isochronous adjustment of the spring for change of arc, and

thereby introduce greater errors than it is proposed to correct. Of the plan connected with the balance, several modifications are given, but as the principle is identical in all, the one to which Mr. Eiffe attaches the most importance will be selected for illustration. This plan is represented in

Fig. 2.

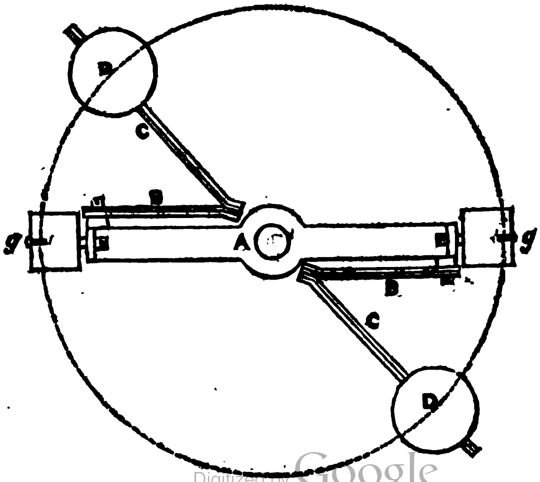


where it may be observed that in addition to the ordinary compound laminæ, the balance is furnished with two segments E E terminating in springs to allow of their being carried in by the laminæ B. The arrangement is intended to act as follows: from the extreme cold to mean temperature the ordinary compensation is alone employed, but at mean temperature the laminæ come in contact with the segments E E which are carried in from that point to the extreme heat as auxiliary weights. The effect would therefore be produced on the time during the first half of the temperature until the auxiliary was brought suddenly into action, when, as it then only moves at the same rate with the laminæ, its effect would not afterwards accumulate. This class does not, consequently, fulfil the first condition. which requires that the auxiliary should gradually accumulate throughout in the progression marked on the diagram, Fig. 1. By way of familiarly illustrating this point, it may be observed that it is similar to an engine-driver, who, instead of obeying his instructions to proceed at a speed increasing at a certain rate throughout the journey, as there would be obstacles at all the stations except he arrived at the time given, should run his engine at a uniform rate during the first half of the journey, and at twice the speed during the second half, it is evident that, although he might arrive at his journey's end in proper time, he would come in contact with the obstacles at every station except the middle one. Tested by the second condition, it would perhaps be too much to say that no modification of this class could be adjusted, after long practice, without actual trial; but the extreme delicacy of adjustment, which the smallness of the motion in the laminæ necessitates, renders it very improbable. The smallness of the motion also stands in the way of the class agreeing with the third condition, for as the entire motion is only 1-250th of an inch (about the thickness of ordinary letter paper), and as the points of contact between the laminæ and the auxiliary would never lie further apart than half this minute quantity, it is evident the slightest change between the bearing surfaces would prevent any action of the auxiliary at all. Concerning the fourth condition, some modifications interfere materially with the free action of the primary compensation, as in the instance before us at Fig. 2; there are, however, other arrangements, in which this condition is complied with, by having separate pieces of compound laminæ for moving the auxiliary weights, and rendering them independent of the primary compensation.

It may here be remarked that one indispensable feature has been forgotten in Mr. Eiffe's plans, viz., a banking for the segments E E to rest against during the range in which they are intended to remain out of action; for without a provision of this kind, the centrifugal force caused by the motion of the balance would keep the supplementary pieces always in contact with the rim; indeed it will be seen by holding one of these balances in a perpendicular direction up to the light, that, if the springs are weak enough for the laminæ to bend them, the weight of the piece will alone be sufficient to make it fall some distance to or from the rim. This defect, however, belongs more particularly to Mr. Eiffe's plans than to the class, as Mr. Molyneux provided a banking instead of a supplemental weight being carried in; other persons have proposed arrangements which prevent a portion of the laminæ bending from mean temperature to the extreme cold, the whole of the rim being free to bend in the heat, and thus producing, by opposite means, the end of making the relative effect of the compensation greater in the heat than in the cold; but besides the defects already enumerated as belonging to the class, this method, if applied to the lamina of the primary compensation, might suddenly cause a very considerable change in the chronometer's rate; for as the quantity required to be cut off from the lamina is only 1-45th of the entire length, and as the motion of the weight is only 1-250th of an inch, whilst the portion required to be taken out of action would only bend 1-45th of this quantity, it is evident the clamp could not act at all unless it embraced a much larger portion of the rim. The clamp is believed to be generally made to embrace about a quarter of an inch, so that at a few degrees below the temperature for which the adjustment was made, an error might be introduced into the compensation of a greater amount than the supplemental error altogether. The method of cutting off a portion of the laminæ, whether by clamps, arms, or springs, should therefore never be employed except in conjunction with separate pieces of laminæ detached from the primary compensation, when if it did not effect much good it could not do much harm.

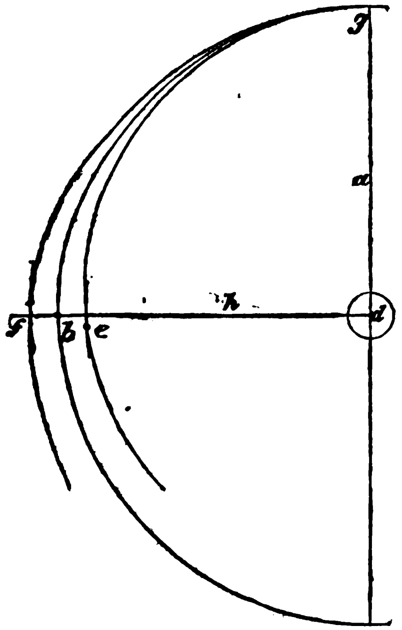
This brings us to the second class, which, unlike the preceding, aims at producing an accumulating effect throughout, the means employed being, with one exception, different arrangements of the ordinary compound laminæ. In selecting an instance from this class for examination, preference has been given to Mr. Dent's plan, as it is more generally known than any other. In the account of Mr. Dent's method, published in the "Nautical Magazine" for November, 1842, several modifications are described, one of which is shown in

Fig. 3.



where it will be observed that A is the bar of the balance; B the primary compensation, and C the secondary, both A and B being composed of compound laminæ; D is the weight. Mr. Dent assumes, for the ground upon which he rests his improvement, that the lamina, as arranged in the ordinary balance, decreases in motion the nearer it approaches the centre; exactly the reverse of this, however, takes place, as will be explained by the diagram,

Fig. 4.



Let a represent the diameter of the balance, and b the compound rim at mean temperature, when it would be concentric with the centre of the balance d; if the segments e and f are drawn by moving the centre an equal distance on each side of the centre, of the balance to and from the point g, where the lamina remains immoveable, e will represent the position of the laminæ in the heat, b in the middle temperature, and f in the cold. Next let equal lengths (not arcs) of the lines b, e, f, from g, be marked off by a dot on each, and these points bisected with segments drawn concentric with the centre of the balance d, from which point we lastly carry a radius h across them. On measuring the distance along the radius between the concentric segments, it will be found that from e to b is longer than from b to f, thus showing the motion of the laminæ towards the centre to be greater in the heat, and not smaller, than it is in the cold. In this diagram the motion of the lamina is greatly increased over the proportion it would bear to the other parts, if drawn to scale, in order that it might be more readily seen. From the entire motion being, as before stated, only 1-250th of an inch in the actual balance, the difference of ratio between e b and b f would of course be proportionably small. With this digression concerning the ordinary balance, the action of Mr. Dent's construction may now be explained. On a change of temperature, B would move nearly direct to and from the centre of the balance, and therefore form the primary compensation, whilst the motion of C would carry the weight concentric with the centre of the balance nearer to or farther from the point g; by which motion it is intended the secondary compensation shall be effected.

This is Mr. Dent's explanation of the action, and allowing it to be correct, and also that the primary compensation might be thereby effected, attention will now be directed to the secondary. The binding of C in the heat would carry the weight further from g, producing the same effect as though the weight of the ordinary balance had been moved further along the rim. But now, supposing the length of C to be half the length of the laminæ employed in the ordinary balance, which is longer than it would be in reality, then the bending of C in a change of temperature from 32° to 100° Fahrenheit, would move the weight 1-500th of an inch which would produce a difference in the compensation of eight seconds a day, or only one-tenth the quantity necessary. Again the first condition requires that C should not only move, but that it should accumulate in motion at the progression marked on the diagram, Fig 1. This it does not do, for C is composed of the usual laminæ, which would consequently bend at its ordinary rate, and as the motion in the laminæ is too small to produce the required difference of ratio by changing its direction, the effect produced by the bending of C would therefore simply increase the primary compensation to the same extent as though the weights of the ordinary balance had been moved 1-500th of an inch along the rim. Putting these facts together, we arrive at the following conclusions—First, that the supposition concerning the common balance, upon which Mr. Dent built his improvement, is the reverse of the fact; secondly, that the effect which his construction would produce only amounts to one tenth the quantity required; and thirdly, that this small quantity does not accumulate faster than in the ordinary balance, over which the construction would not consequently possess any advantage. This method having failed to fulfil the first condition in any degree, it is unnecessary to examine it by the others. As it was considered that it would save repetition if the various methods were divided into classes, and one example selected from each, the reasoning used in the examination of Mr. Dent's plan must be understood as applying to others of the same kind.

(To be continued.)

Home Correspondence.

GOLD CRUSHING AND WASHING.

SIR,—In the last number of the "Journal of the Society of Arts," Mr. Phillips did me the favour to correct an error of mine and then proceeded to controvert some of the statements I had made with regard to the novelty and merit of Mr. Berdan's apparatus. I certainly am much obliged to Mr. Phillips, for whose authority I have the most sincere respect, for setting me right when I am wrong; but no practical man, it seems to me, can find any similarity between the application of heat in crushing and washing machinery, as it is applied to Mr. Berdan's machine, and the heating of a mixture or paste of mercury and powdered ore, for three or four days together. I did not say that the use of heat was new, as I had just described the Miners' Assay, in which *hot water* was employed; it was only on the scale and in the way in which it is applied in Mr. Berdan's machine, that I spoke of it as a novelty, and such I still consider it. Neither did I claim for Mr. Berdan the merit of inventing the plan of sending the tailings through a mass of quicksilver, as a means of saving the broken portions of that metal, but merely the peculiar mechanical contrivances by which it is effected in Mr. Berdan's separator. If Mr. Phillips had attended the meeting, and heard my remarks in describing the diagrams and models with which my paper was illustrated, he would, perhaps, have thought his letter unnecessary.

What Mr. Phillips means by "putting the public on their guard," as applied to any remarks or acts of mine, I am as much at a loss to conjecture as he would be to explain. What I have done and said has been public and fair; and I can say as much for Mr. Berdan, who has

placed his machine at the disposal of all persons who felt inclined to try it, with their own men, and their ores, and mercury. The privilege thus freely offered has been availed of by large numbers of mining gentlemen, and I believe in every instance with an entire conviction that the machine accomplished all that could be desired. The best evidence of the sincerity of these convictions is to be found in the very large number of machines that have been ordered. I am at a loss to understand why Mr. Phillips should undertake the guardianship of the public in this matter. The public generally manifests a wise discrimination in the selection of the objects of its approval, and certainly the public of this country cannot be accused of exhibiting an overweening fondness for anything new. If any one has an inferior Machine to Mr. Berdan's, the public ought not to desire that it should succeed; if any one has invented a machine equally good, the gold fields of the world are wide enough for both; if any one has a Machine better than Mr. Berdan's, let him bring it forth, and it must soon establish its character and reap the reward it deserves.

Whether I have over-rated the value of Mr. Berdan's machine may perhaps be seen from the Report of Professor Ansted, in to-day's "Times" and "Daily News."

I am, Sir,

Your obedient Servant,

CHARLES F. STANSBURY.

Hampstead, Thursday, Dec. 8th.

ON THE RHEEA FIBRE OF ASSAM, THE TRUE CHINESE GRASS OF CHINA.

SIR,—Observing that the "Journal of the Society of Arts" publishes notices of several Indian products which are likely to be of value as articles of commerce, when their properties become more generally known, and measures are adopted for obtaining them in larger quantities, I am induced to forward this paper. For thus, I believe, the producers in the East may be induced to collect or to cultivate, to prepare, and to send to the markets of Europe a new or little-known article, and take measures for keeping up a regular supply for such manufacturers as may be the first induced to supply them. Otherwise, if a planter, more enterprising than his neighbours, is induced to send a new thing to market, it is usually pronounced to be of "no value," because "not known in the market;" and the importer is sometimes advised to send it in larger quantities for a few years, when it will have a chance of being looked at, and its true value ascertained. The planter is not often inclined to follow this advice, for his first venture has probably been knocked down at a price which does not pay his expenses. The manufacturer, on the other hand, cannot be expected to employ an article with the properties of which he is but partially acquainted, or of which he is not well assured of having, in time, a regular supply and in sufficient quantities.

Publicity, therefore, in such a journal as that of the Society of Arts cannot fail to give information to consumers in Europe, at the same time that it will impart confidence to planters and colonists in distant countries. By this means, therefore, I hope that the milky juice of the *Mudar*, or *Calotropis gigantea*, as well as its fibre, will become sufficiently well known to induce parties in India to collect sufficient quantities of both to allow of their properties and uses being fully investigated, so that they may become established as articles of commerce. But the difficulties are considerable, and the years not a few, which are consumed before a new thing can become established as an article in use, and consequently in demand. Of the truth of this, there is probably no better instance than the subject to which I wish to call the attention of your readers, and that is—a fibre which is neither new to the Society of Arts nor to Mark-lane. It is probably unknown to most people, that in the year 1803, the Lords of the Privy Council for Trades and Foreign Plantations, recommended to the Court of Directors of the East India Company to encourage the growth of strong hemp, &c., in India. Attention had, however, been previously paid to this subject,* but Dr. Roxburgh was subsequently employed in an experimental investigation and cultivation of various fibres which were produced in India, and which he said "may prove valuable substitutes for hemp and flax on some future day in Europe." (*Vide* "Trans. Society of Arts," vol. xxii., p. 389.) Of these fibres some have become extensive articles of commerce, as the *sun* of Bengal (*Crotolaria juncea*), the brown hemp of Bombay (*Hibiscus cannabinus*), and the Jute produced by different species of Conchorus, and which, though weak in fibre, is now imported here in such enormous quantities. But from its fineness, flexibility, and the facility with which it is spun, this is now used for many purposes. There is no doubt that several malvaceous plants of the East are possessed of similar properties.

Among the fibres, however, which Dr. Roxburgh submitted to examination, were some which were remarkable for their great strength, as for instance, the *Caloee* of Sumatra, and of which he obtained a few plants from Bencoolen, and cultivated them in the Botanic Garden at Calcutta. This he subsequently named *Urtica tenacissima*. He found that it could be cultivated with great ease, its stems cut four or five times in the year, and that though its fibres were separated with great difficulty, they were possessed of great strength, as well as fineness and softness. He was informed by a friend at Canton that the grass-cloth of China was made from these fibres. In the year 1811, three bales of this fibre were sent from the Calcutta Botanic Garden to the East India House. These the Court of Directors forwarded to Messrs. Sharpe, of Mark-lane, who reported that a thread spun of this fibre bore 252 lbs., whereas the weight required to be borne by Russian hemp of the same size in Her Majesty's Dock Yards was only 82 lbs. (*Vide* "Illustrated Catalogue" India, p. 883.) The Society of Arts, in the year 1814, awarded a silver medal to Captain J. Cotton, of the East India Company, for the introduction of this fibre, of which the reports were so favourable for strength and other qualities.

Since that time China grass has been imported on various occasions into this country, and the fibres have been skilfully prepared by different parties, so as to have the lustre and whiteness of silk. No less than three Prize Medals were awarded at the Great Exhibition for these beautiful preparations: that is, to Messrs. Wright and Co., of London; to Messrs. Marshall, and to Messrs. Hives and Atkinson, of Leeds. I believe that a fourth was awarded for the same fibre, though under a different name: that is, to Mr. Weber, of Java, for some beautiful fibre sent by the Singapore Committee, which he called *ananas*, or pine apple fibre; also *Linum usitatissimum* and *Boehmeria candicans* on the same label. Some difficulties, it is understood, are experienced in spinning this China grass, but they are difficulties which have been overcome by the Chinese, as they prepare from it their famous grass-cloth. Sir W. Hooker informs us (*Vide* "Kew Journ. of Botany," vol. I., p. 25, and vol. III., p. 313) that he had obtained satisfactory information through Sir George Staunton and Dr. Wallich, that the so-called Chinese grass was the fibre of a plant called *Urtica nivea* by Linnæus, but *Boehmeria nivea* by Gaudichaud. This he also identifies with the *Urtica tenacissima* of Dr. Roxburgh, who, as we have seen, was long since informed that it yielded the Chinese grass fibre. The greatest difficulty, however, attending the employment of Chinese grass for textile fabrics in this country, has been caused by the high price to which it was constantly liable to rise, that is to 80*l*., and even 120*l*., a ton.

At the same time that the above Prize Medals were awarded for China grass, honourable mention was made of Major Hannay and Captain Reynolds, as well as of Baboos Deena Nath and Lokinath, for sending specimens

* See "Productive Resources of India," by J. F. Royle, p. 108.

of Rheea fibre, which is used in Assam for making fishing lines and nets. The same fibre was also sent from Rurg pore and from Singapore. The "Journal of the Agri-Horticultural Society of Calcutta" contains numerous notices of the same fibre being found in various localities: as in Cachar, in the Shan province of Ava, in Tenasserim, as well as in Rungpore and throughout Assam, down to Siam, Singapore, and Sumatra, as well as Java; though under the different names of Rami, Calloee, Rheea, Kankhura, Pan, &c., being everywhere employed for making the strongest fishing-lines and nets, also for cordage and for weaving both a stout and a fine kind of cloth.

It is not surprising, therefore, that so many individuals have endeavoured to draw attention to this fibre, though without success in making it known to the commercial world. A fresh impulse was given to this subject when one of the educated Chinese, introduced into Assam on account of the tea manufactory established in that valley, recognised the Rheea of Assam to be identical with the *Chu-Ma*, or China grass of his own country. The Agri-Horticultural Society of India obtained specimens from Dr. Macgowan, settled at Ningpo, of the Chu-Ma. These Dr. Falconer, Superintendent of the Calcutta Botanic Garden, found to be "the same plant as the *Boehmeria nivea* of botanists, described under the name of *Urtica tenacissima* by Roxburgh." He further says, "The specimens from China correspond exactly with those grown in the Botanic Garden, with which I have compared them." Finally, Mr. W. Sangster, of this capital, who was well acquainted with the properties of the original China grass, obtained some specimens of the Rheea grass from Assam, and found them for all practical purposes to be the same. These were shown in the Great Exhibition of 1851.

Though Major Jenkins was the first to call attention to the Rheea grass of Assam. Major Hannay has most perseveringly inquired into the culture and preparation of this fibre, so as to bring it into notice as a commercial article, and has for this purpose forwarded, in conjunction with Captain Dalton, ten bales of the cultivated and five of the wild Rheea fibre, to the Indian Government. These have arrived at the India House, and specimens are sent to the Society of Arts, for the inspection of members, and in order to ascertain the probable value of these fibres in the English market, so that planters may be induced to grow and collect them in large quantities for export to Europe.

The Rheea plant is already cultivated by the natives of Assam to make fishing-lines and nets. Its shoots can be cut down several times a year, and its fibres they know how to separate. Major Hannay has been able to improve the process by the assistance of the Chinese in Assam. Captain Thompson, of the house of Thompson & Co., ropemakers, of Calcutta, found the Rheea fibre from Rungpore to be three times stronger than the best Russian hemp, and the wild Rheea everything that could be desired for ropemaking, though the cultivated kind, probably from a difference in the preparation, he thought a little too rigid for the running rigging of ships. But as there is no doubt of the strength and flexibility of their fibres, it is to be hoped that they will, when more generally known, be more extensively employed for ropemaking both in India and England, especially as they can be produced at a price under that of Russian hemp. Neither the royal nor mercantile navy need therefore be restricted to European sources of supply for this essential part of their equipment, but as the Rheea of Assam, like the Chu-Ma of China, produces fibres of different degrees of fineness, according as they are taken from the later or the earlier crops, so may they, though rivalling those of grass cloth in fineness, exceed those of Russian or of Polish hemp in strength.

J. FORBES ROYLE, M.D.

STAMP ON NEWSPAPERS.

SIR,—The following form of petition was prepared in the year 1830, praying for the repeal of the Stamp on Newspapers It is remarkable how apposite are the arguments at the present time, after the lapse of nearly a quarter of a century. It may help the Institutes in Union to some points, when they present their petitions next session for the repeal of the Stamp duty.

Your obedient servant,

F. S.

The Right Honourable the Lords Spiritual and Temporal, of the United Kingdom of Great Britain and Ireland, in Parliament assembled.

The Petition of the undersigned Inhabitants of the City of London,

HUMBLY SHEWETH,

That your Petitioners believe the prosperity of every community is invariably commensurate with the progress of knowledge, and that a people trained in habits of reading and reflection will possess more resources for the creation of wealth, and the promotion of their own happiness, than it would be possible for them to command while in a state of ignorance.

That it is therefore the first duty of a state to remove every obstacle to the diffusion of knowledge, and to give the greatest facilities for the circulation of all known facts, and the free discussion of all opinions.

That your petitioners have seen with regret that the duties now levied upon newspapers, advertisements, paper, and books, have all the pernicious effects of TAXES ON KNOWLEDGE, and tend directly to check, and limit the spread of information among the people.

That the duty on newspapers in particular produces the following evil results:—

1. It places beyond the reach of the poor man that kind of information which is the most calculated to interest his mind, and rouse its dormant powers into activity, namely that which is emphatically *news*, and relates to the stirring incidents of the day.

2. It excludes him from all knowledge of the proceedings of the legislature, and of the laws which he is called upon to obey.

3. It deprives him of the means of learning how those laws are administered, and of profiting by the example of those who may incur legal penalties; the only reports of the proceedings of the courts of law, and of the police-offices, being given in the newspapers.

4. It keeps him in ignorance of the various relations of society, the duties of citizens, the best markets for labour, the means of bettering his condition, and of an immense variety of miscellaneous intelligence, for which a newspaper is the only efficient channel of general communication.

5. It exposes him to the influence of cheap and inflammatory publications, which it has been found the law cannot put down, while journals of a better class, which would counteract the evil, are to him rendered inaccessible.

6. It is an incentive to intemperance, as the poor man, in search of a situation, can only obtain a sight of the advertisements in a sevenpenny journal, by calling for liquor in a public house.

7. By limiting the number of purchasers, and thereby diminishing the chances of successful competition, it gives to a few leading journals a species of monopoly, and a power in the direction of public opinion, which is often productive of great injury, while, if the duty were withdrawn, newspapers would become so numerous and cheap, that no individual would confine his reading to one journal, and in accustoming himself to judge between conflicting accounts and opposite opinions, he would be less likely than he now is, to be deceived by ex-parte statements and interested falsehoods.

That your petitioners have remarked that the class the most dangerous to life and property, the turbulent peasantry of Ireland, and the incendiaries of England, are at the same time the most ignorant and uneducated class, and consist of persons who rarely see either books or newspapers during their whole lives.

That your petitioners are of opinion that even the arbitrary and intolerant principle of a censorship, upon all cheap political publications, would be preferable to a system which prohibits them altogether; and that no financial considerations can justify the raising of any portion of the revenue by means which tend to keep the people in a state of intellectual and moral debasement.

That your petitioners have never heard any argument against the removal of the duties which impede the circulation of the newest kinds of intelligence, that has not been urged against, and does not equally apply to the very existence of the press, and that such fiscal restrictions cannot be consistently defended,

excepting by persons who believe that the art of printing should be abolished altogether, because it has been sometimes abused to evil purposes.

Your petitioners therefore pray for the immediate repeal of the Stamp duty on Newspapers, the duty on Advertisements, and the duties upon paper, used for writing or printing, and upon foreign Books.

Proceedings of Institutions.

BOSTON.—The lecture season at the Athenæum was commenced about a month since by the Vicar (the Rev. G. B. Blenkin), who lectured on the "Advantages of Literature." On the 25th ultimo, a lecture was delivered by the Rev. A. Lunn (Unitarian). It was entitled, "A Glance at the Freedom of Slavery of Europe." There are at the present time 420 members. The committee have determined on getting up an Exhibition, to be opened after Christmas. Mr. J. W. Bontoft, the Honorary Secretary, will be glad to receive communications on the subject from kindred institutions, and from any one interested in such matters.

MACCLESFIELD.—The eighteenth Annual Meeting of the Society for Acquiring Useful Knowledge, was celebrated in the Town Hall, on Wednesday se'nnight, the President of the Society, John Brockelhurst, Esq., M.P. in the chair. The President remarked that the success of the Society was proved by the fact that upwards of 5,000 young men had passed through it, some deriving great and lasting advantages from it, some lesser, but all of them some benefit. The trade of the country was now in difficulties—in a panic and dilemma—and he could assign no stronger reason for Macclesfield feeling so little of it, but that the public were better instructed than elsewhere how to manage their own business, and, as the saying was, "to keep the wolf from the door." And he was sure that in this respect they were deeply indebted to this institution. He could scarcely hear of a manufacturing house in the town where there was not one or more of the young men educated in the institution assisting in the business. They exhibited a greater degree of intelligence than others; and we all know that upon that intelligence, next to Providence, prosperity mainly depends. The report of the Committee, which was read by Mr. Curwen, the honorary secretary, stated that, since the last general meeting, an additional subscription eading-room had been erected, and that the accommodation for reading now provided for the members was not surpassed by any institution of a similar kind in the kingdom. The reading-rooms were now supplied with ten daily and thirteen weekly newspapers, in addition to five weekly and thirty-two monthly periodicals. An addition of four hundred volumes has been made to the library; and a donation of 20*l*. had been received from Mr. T. Brocklehurst, in aid of the library fund. The classes were in a very prosperous and improving condition, both as respects the numbers in attendance and the progress of the pupils. The annual receipts of the society during the year had been 566*l*. 13s. 6d.; the expenditure had been 562*l*. 12s. 7d leaving a balance with the treasurer of 4*l*. 0s. 11d. The Rev. C. A. J. Smyth moved, and Mr. E. C. Egerton, M.P., seconded, the adoption of the report, which was carried unanimously. The president then proceeded to read the reports of the teachers, and the adjudication of the prizes, after which their presentation to the successful members took place.

To Correspondents.

MR. CHARLEY'S fifth letter, on "Flax and its Products in Ireland;" is unavoidably deferred till next week.

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Mr. J. Phillips, "On the Philosophy of Geology."
Brit. Architects, 8.
Geographical, 8½.—Lieut.-Gen. Jochmus, second portion of the paper, "Journey into the Balkan or Mount Haemus; with a description of the defiles through this celebrated mountain-range, and a comparison of the routes pursued by Darius, Hystapes, Alexander the Great, and Marshal Diebitch."

TUES. Syro-Egyptian, 7½.—1. Mr. Black, "On the Sands of the Valley of the Nile." 2. Dr. Camps, "On certain Notices of early Egyptian Chemistry." 3. Mr. Hesley, "On some Small Stamped Terra Cottas, supposed to be Coin, found at Palmyra." 4. Dr. Loewe, "Origin of the name Memphis, and translation of an Inscription on a Bust excavated at Palmyra." 5. Mr. Ainsworth, "On the Mounds of North Syria."
Civil Engineers, 8.—Discussion of Mr. J. T. Harrison's paper on "The Drainage of the District South of the Thames."
Medical and Chirurgical, 8½.
Zoological, 9.

WED. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Literary Fund, 3.
Roy. Soc. Literature, 4½.
Society of Arts, 8.—Mr. J. J. Mechi, "Third Report of the Results of his Experiments at Tiptree Hall Farm."
Geological, 8.—1. Mr. T. Davidson. "On the Structure of Chrometes Comoides." 2. Dr. J. D. Hooker, "On a peculiar Fossil Plant from the Glasgow Coal Shale."
Graphic, 8.
Pharmaceutical, 8½.

THURS. London Inst., 7.—Mr. F. Warren, "On the Cotton Manufacture."
Antiquaries, 8.
Royal, 8½.

SAT. Asiatic, 2.
London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany."
Medical, 8.

Miscellanea.

PATENT-RIGHT.—A correspondent suggests that it would be very desirable to ascertain, What is the amount of money paid per annum for Patent-right by the Metal Trades or Manufactures of this country?

PHOTOGRAPHIC EXHIBITION.—The Council of the Photographic Society have determ ned to open an exhibition on Monday the 2nd of January, representing the progress made since the exhibition at the Society of Arts. Daguerreotypes and photographs will be shown, and also coloured pictures in either branch, provided they are accompanied by an untouched specimen of each coloured picture. It will be opened to all the world, and will be held at the Society of British Artists in Suffolk-street.

THE ATLANTIC AND PACIFIC JUNCTION COMPANY.—The governments of this country, of France, and of the United States have at length resolved to afford the necessary assistance, in the shape of an armed force and a staff of engineers, for completing and authenticating before the world the survey of a route for the proposed inter-oceanic cut navigable for vessels of any size across the Isthmus of Darien. It will be recollected that this undertaking, of which Dr. Cullen must be regarded as the originator, was coldly received by the public in consequence of the large sum (£15,000,000 sterling) demanded for its completion, and the imperfect character of the report made upon it by Mr. Lionel Gisborne, the chief engineer of the Company. It was contended that the first efforts of the Company should be directed to the task of obtaining a more thorough and satisfactory survey of the route, and of collecting data upon which the public might be able to form a definite opinion as to the practicability of the enterprise. The want of means and other difficulties would probably have delayed for some time the accomplishments of these objects; but, with a generous solicitude for the success of an undertaking so long the dream of great

minds, and so important to the commerce and civilisation of the world, the three leading maritime powers have come forward and offered their assistance. The Government of the United States, having the largest interest in the matter, led the way, but England and France have not been slow to follow the example. On the 17th of this month the West India mail steamer, which starts from Southampton, will carry out to Panama the Government officers and the officials of the Company who are to constitute the British portion of the surveying expedition. Mr Lionel Gisborne and Mr. Ford are, of course, to go out on the part of the Company, and will now be enabled to complete their surveys of the route without encountering the dangers to which they were formerly exposed. Dr. Cullen also accompanies the expedition, and will be its pioneer. At Jamaica the explorers will be joined by a staff of engineers from the United States, under the command of Lieutenant Strange, and they will then proceed with two British men-of-war, the French flag-ship from Martinique, and the American Syana, to Caledonia Bay, where their operations will commence. A third vessel from our fleet in the Pacific will, at the same time, be sent round to the Gulf of St. Miguel, and co-operate from that side, so that all difficulties prescribed by the wooded character of the proposed route, and by hostile Indian tribes, will be effectually overcome. A more important expedition for the commerce and civilisation of the whole world has seldom been undertaken, and, looking at the magnitude of the results depending upon it, while all must wish it good speed, the only wonder is that it should have been so long deferred.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

From Gazette, 2nd December, 1853.

Dated 9th August, 1853.

1853. H. des Montis, Paris, and 16 Castle street, Holborn—Improved system of publicity.

Dated 5th October, 1853.

2272. A. Turiff, Paisley—Retarding apparatus for preventing accidents on railways.
2278. H. Stevens, Trafalgar square—Preserving vegetable substances.

Dated 11th October, 1853.

2328. J. O. Sharp, Paisley—Preventing accidents on railways.

Dated 12th October, 1853.

2344. R. W. Waithman, Bentham House, Yorkshire—Apparatus for applying paint, &c., and for cleaning carriages, &c.

Dated 14th October, 1853.

2364. W. Jones, Porchester street, Hyde park square—Compound for curing cuts, burns, &c.

Dated 21st October, 1853.

2432. J. G. Marshall and P. Fairbairn, Leeds—Combing machinery.

Dated 27th October, 1853.

2490. W. McNaughton, Manchester—Printing yarns for weaving carpets, also printing carpets, &c.

Dated 28th October, 1853.

2499. W. Thompson, 6 Clayton street, Lambeth—Instantaneously extinguishing fires.

Dated 1st November, 1853.

2520. J. Bottomley, Bradford—Ornamenting textile fabrics.

Dated 5th November, 1853.

2570. J. B. Nicklin, Bartholomew lane, London—Lubricating compound.

Dated 10th November, 1853.

2602. W. Pidding, Tachbrook street, Pimlico—Fabrics of silk, cotton, wool, &c., application of such materials and machinery for same.

Dated 11th November, 1853.

2617. A. Easton, Barnard's Inn—Lamp.

Dated 14th November, 1853.

2631. J. T. C. Hill and E. Cottrill, Birmingham—Stamps and presses, &c.
2633. S. F. Cottam, Manchester—Spinning machinery.
2636. A Cunninghame, Glasgow—Sulphuric acid.
2637. A. P. Coubrough, Blanefield, Stirlingshire—Bleaching apparatus.
2639. W. Smith, Mauchline, Ayrshire—Ruling ornamental figures.
2640. C. de Bergue, Dowgate hill—Machinery for removing patterns from moulds.

Dated 15th November, 1853.

2642. J. J. Catterson, Islington—Carriage springs.
2643. C. E. Blank, Trump street, London—Winding yarn into hanks. (A communication.)
2644. J. Liddell, Glasgow. Power-loom weaving.
2645. J. Cameron and J. Napier, Loughor, Glamorganshire—Obtaining gold and silver from ores, &c.
2646. J. H. B. Thwaites, and Dr. W. B. Herapath, Bristol—Manufacture of quinine and other alkaloids.
2647. A. Delcambre, Paris—Machinery for distributing type.

Dated 16th November, 1853.

2649. Lieutenant P. A. Halkett, R.N.—Lifting and lowering ships, &c.
2651. J. W. Wayte, Gate street, Lincoln's inn fields—Self-feeding furnaces.
2653. P. Hill, Gravel House, Coggleshall, Essex—Weaving plush, &c. (A communication.)
2655. J. H. Johnson, 47 Lincoln's inn fields—Thrashing machines—(A communication.)
2657. J. Ferguson, Heathfield, Lanarkshire—Furnaces and prevention of smoke.
2659. T. Jackson, Commercial road, Pimlico—Hat manufacture.

Dated 17th November, 1853.

2661. G. Carter, Mottingham, Kent—Steam-engine boiler, furnaces, &c.
2663. G. Dugmore and G. H. Millward, Birmingham—Signalling and communicating on railway trains.
2665. W. Ashton, Manchester—Machinery for manufacturing braid.
2669. T. Bourne, West Smithfield—Construction of buckles.
2671. R. Griffiths, 444 Strand—Propelling vessels.

Dated 18th November, 1853.

2672. P. F. Keogh and W. A. Wilson, Liverpool—Steam-engines.
2673. P. M. Parsons, Duke street, Adelphi—Railway and other carriages.
2674. A. Guy, 32 Upper Rosamond street, Clerkenwell—Portable water-closet.
2675. C. and J. Fernihough, Dukinfield, Cheshire—Machinery for wringing, twisting, glossing, &c., silk, cotton, &c.
2676. T. Holmes, Pendleton, Lancashire—Ventilating drying stoves.
2677. J. Gale, Junior, Edinburgh—Electro-magnetic engines.
2678. A. F. Rémond, Birmingham—Steam-boilers.
2679. W. Taylor, 16 Park street, Gloucester gate, Regent's park—Anchors.
2680. J. Melville, Roebank Works, Lochwinnoch, Renfrewshire—Printing textile fabrics.
2681. J. B. Clavières, Paris, and 4 South street, Finsbury—Mode of giving publicity.
2682. M. Poole, Avenue road, Regent's park—Condensers, evaporators, and heaters for steam-engines. (A communication.)
2683. P. B. O'Neill, Paris—Perforated buttons (A communication.)
2684. J. H. Brown, Arthur-seat, Aberdeen—Artificial skins.
2685. H. R. Cottam, 1A, Sussex terrace, Hyde park gardens—Portable houses.
2686. J. Rice, Foley place, and W. Matthews, Portugal-street—Instrument for taking and applying vaccine matter.
2687. R. S. Norris, Warrington, Lancashire, and E. Talbott, Crewe, Cheshire—Manufacture of iron.

Dated 19th November, 1853.

2688. J. Harris, Hanwell—Heating water.
2690. M. Poole, Avenue road, Regent's park—Breech-loading fire-arms, &c. (A communication.)
2691. W. Austin, 27 Holywell street—Tiles and tubes.
2692. E. Rowland, Mossley, Belfast—Apparatus to be applied to a railway truck, for sounding a whistle and putting such truck in motion.
2693. T. J. Dimsdale, Dublin—Use of certain substances for defecation, &c., of saccharine juices, &c., and for neutralising noxious gases.
2694. J. G. Potter and R. Mills, Darwen, Lancashire—Carpet manufacture.
2695. E. Wharton, Birmingham—Railway wheels.
2696. H. Daniell, St. Austell, Cornwall—Apparatus for drying clay.
2697. R. F. Brand, South terrace, Willow Walk, Bermondsey—Fire-arms.

Dated 21st November, 1853.

2698. W. H. Tucker and W. R. Reeves, Tiverton—Locks.
2699. J. Scott, Junior, Greenock—Steering vessels.
2700. H. Wigglesworth, Newbury—Improvement in pistons.
2702. Sir J. S. Lillie, C.B., 4 South street, Finsbury—Apparatus for producing carburetted hydrogen gas. (A communication.)
2703. R. J. Sibbald, Paddington, Edgehill, West Derby—Communicating from vessels to the shore, &c.
2704. A. Radcliffe, Chichester place, King's cross—Improved glaziers' diamond.
2705. J. Cashmore, Bevis Marks—Communicating signals on railways.

Dated 22nd November, 1853.

2708. W. Greaves, Leeds—Indicator-alarum, applicable to railways.
2709. A. Bain, Paddington—Card cases.
2711. A. Bird, Birmingham—Communicating signals on railways.
2713. F. Meyer, Paradise street, Lambeth—Treating fatty matters for candles.
2714. F. Levick and J. Fieldhouse, Cwm Celyn, Blaina Ironworks, Monmouthshire—Machinery for raising coals and minerals.
2715. F. Meyer, Paradise street, Lambeth—Bleaching oils and fats.
2716. C. Ramsay, North Shields—Ships' and other pumps.
2717. W. Pegg, Leicester—Instrument for cutting out garments, &c., and grinding cutters for same.
2718. F. Arding, Uxbridge—Machinery for cutting, &c., vegetable substances.
2719. B. Burleigh, Great Northern Railway, King's cross—Railway crossings adapted to the double-headed rail and ordinary rail and chair.

APPLICATIONS FOR PATENTS, WITH COMPLETE SPECIFICATION, FILED.

2777. L. A. Michel, Paris, and 16 Castle street, Holborn—System of apparatus for sawing and breaking sugar.—29th Sept. 1853.

WEEKLY LIST OF PATENTS SEALED.

Sealed December 2nd, 1853.

1354. William Hammond Smith, of Gloucester row, Walworth—Improvements in the manufacture of parchment.
1362. Jean Durandeau, jun., of Paris—Certain means of obtaining marks and designs on paper.
1363. Ferdinand Louis Gossart, of Rue Montmartre, Paris—System of permanent circulation of caloric, intended to produce and overheat steam, gas, and liquid.
1365. James Spotswood Wilson, of Tavistock place, Russell square—Machine or apparatus for digging or raising earth, and applicable to agricultural or engineering purposes.
1369. James Hayes, of Elton, Huntingdon—Improved machinery for raising and stacking straw, hay, corn, and other agricultural produce.
2113. Alfred Vincent Newton, of Chancery lane—Improved machinery for crushing and grinding mineral and other substances. (A communication.)
2187. Alfred Vincent Newton, of Chancery lane—Improved method of forming seams and ornamental stitching, and in machinery for effecting such operation, part of which machinery is applicable to the forming of other seams and stitches. (A communication.)
2225. William Edward Newton, of Chancery lane—Improved machinery for cutting metal or other substances. (A communication.)
2251. Robert Halliwell, of Bolton le Moor, and William Johnson, of Farnworth—Improvements in machinery for spinning and doubling cotton and other fibrous substances, and for grinding-cards.
2261. Peter Rothwell Jackson, of Salford—Improvements in machinery for manufacturing hoops and wheels.
2269. William Gossage, of Widness—Improvements in obtaining certain saline compounds from solutions containing such compounds.

Sealed December 5th, 1853.

1386. George Carter, of Mottingham, Kent, and George Marriott, of Hull—Improvements in the manufacture of white lead.
1388. John Walter Friend, of Caunto road, Southampton—Improved method of measuring and registering the distance run by ships and boats proceeding through the water, which is also applicable to measuring and registering tides and currents.
1396. Frederick Lipscombe, of the Strand—Improvements in the construction of ships and boats.
1399. Alexander McDougall, of Manchester—Improvements in the manufacture of potash and soda ash.
1409. Claude Aruoux, of Paris—New system of towing and traction.
1413. Edward Maniere, of Bedford row—Improvements in the manufacture of paper.
1431. Thomas James Perry, of the Lozells, Astoro-juxta-Birmingham—Improvements in raising and lowering Venetian and other blinds; applicable also to the raising and lowering of other bodies.
1459. Edward Walmsley, of Heaton Norris, and John Holmes, of Manchester—Improvements in, and applicable to, steam engines.
1515. Charles Cowper, of Southampton buildings—Improvements in the manufacture of cadrs, or substitutes for cards, for the Jacquard loom. (A communication.)
1589. Edward Davies, of Gothenburg, Sweden—Improvements in machinery or apparatus for carding and otherwise preparing cotton or other fibrous materials to be spun, and also for cleaning or stripping cards used in the said operations.
1583. Richard Bradley, and William Craven, of Wakefield—Improvements in moulding, forming, and compressing of clay for the manufacture of bricks, tiles, and other earthenware.
1603. Alfred Vincent Newton, of Chancery lane—Improved machinery for printing. (A communication.)
1657. Martin Samuelson, of Hull—Improvements in the manusacture of bricks and other articles from plastic materials.
1949. Alexander Cuninghame, of Glasgow—Improvements in the manufacture or production of alkalis and their salts, or alkaline salts.
2126. John Wilson, of Manchester—Improvements in, and applicable to, machines for printing fabrics.
2301. Francis Whitehead, of Crayford, and William Whitehead, of the same place—Improvements applicable to lanterns, lamp shades, and reflectors for reflecting, concentrating, or diffusing light.
2305. Joseph Denton, of Prestwich, Manchester—Improvements in looms for weaving.
2313. William Edward Newton, of Chancery lane—Improvements in fire-arms and cartridges. (A communication.)
2319. Frederick Warner, and John Sholton, both of the Crescent, Jewin street—Improvements in the manufacture of large bells.
2359. Abraham Pope, of Edgware road—Improvements in furnaces.
2301. Charles Ludovic Augustus Meinig, of Leadenhall street—Improvements in galvanic batteries.
2375. Charles Coates, of Sunnyside, near Rawtenstall, Lancashire—Improvements in, and applicable to, looms for weaving.
2377. Benjamin Price, of Fieldgate street, Whitechapel—Certain improvements in the means of, or apparatus for, reducing the quantity of smoke from the furnaces of boilers, coppers, pans, and other like vessels.
2387. Augustus Applegath, of Dartford—Improvements in printing and embossing paper, with a view to prevent forgery.

Sealed December 7th, 1853.

1395. Henry George Rowe, Albert George Andrew, and William Henry Andrew, all of Sheffield—Improvements in the mode of fastening the handles to table knives and forks.
1430. Joseph Spencer, of Bilston—New or improved cupels.
1486. Edgar Breffit, of Castleford, Yorkshire—Improvements in the manufacture of glass-house pots.
1816. John Macintosh, of Pall Mall—Improvements in the construction of bridges, viaducts, and other like structures.
1970. Thomas Hill, and Alexander Thomson, both of Glasgow—Improvements in the manufacture of pipes or hollow articles from plastic materials.
2006. Charles Goodyear, of Avenue road, St. John's Wood—Improvements in the manufacture of waterproof fabrics.
2075. Edwin Lumby, and Zacchœus Sugden, of Halifax—Improvements in needles or wires, used in the manufacture of carpets, looped pile fabrics, and velvets.
2138. Thomas Swingler, of Victoria Foundry, Litchchurch—Improvements in the permanent way of railways.
2211. Henry Winter, of Castle street—Improvement in trousers to supersede the use of braces: which improvement is applicable to other articles of apparel.
2242. Charles Coates, of Sunnyside, near Rawtenstall—Improvements in coupling pipes, and other articles, and in apparatus connected therewith.
2264. John Norton, of Cork—Improvements in firing explosive compounds.
2268. William Geeves, of New Wharf road, Caledonian road—Improvements in the manufacture of bricks.
2310. Henry Richardson Plumpton, and James Leonard Plumpton, of Massachusetts, U.S.—New and useful article of furniture to serve the purpose of a bedstead, a toilet table, or a washstand and a writing desk.
2312. Henry Clayton, of the Atlas Works, Upper Park place, Dorset square—Improvements in the manufacture of bricks and tiles.
2316. George Fergusson Wilson, of Belmont, Vauxhall—Improvements in treating wool and fabrics composed of wool.
2318. George Fergusson Wilson, of Belmont, Vauxhall—Improvements in the manufacture of soap.
2334. William Henry Muntz, of Massachusetts, U.S.—New and useful improvement in paddle-wheels for navigable vessels.
2354. Robert Popple, of Beverley, and Henry Woodhead, of Kingston-upon-Hull—Improvements in machinery for slubbing, roving, and spinning cotton and other fibrous substances.
2356. William Robinson, of Manchester—Improvements in machinery or apparatus for manufacturing or forging iron or other metals into screw-bolts, nuts, rivets, pins, studs, or other similar articles.
2370. William Edward Newton, of Chancery lane—Improved machinery for preparing and combing wool. (A communication.)
2386. George Laurie, of New York—Improvements in the manufacture of artificial teeth and gums. (A communication.)
2394. Samuel Cunliffe Lister, of Bradford, Yorkshire—Improvements in combing cotton and wool.
2396. Augustus Applegath, of Dartford—Improvements in letterpress printing machinery.
2412. George Collier, of Halifax, Yorkshire—Improvements in the manufacture of carpets and other fabrics.
2414. Charles Barraclough, of Halifax, Yorkshire—Improvements in the manufacture of carpets and other fabrics.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Dec. 2	3536	The Balmoral Tie	John Patterson	104 Wood street, Cheapside.
„ 3	3537	Ventilating Bobbin or Spool	Thomas Barnes and William Johnson	Farnworth, Lancaster.
„ 7	3538	A Solid Spring-Knife Handle	John Lingard	Pea Croft, Sheffield.

Journal of the Society of Arts.

FRIDAY, DECEMBER 16, 1853.

FIFTH ORDINARY MEETING.

WEDNESDAY, DECEMBER 14, 1853.

THE Fifth Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 14th instant, HARRY CHESTER, Esq., in the Chair.

The following candidates were balloted for, and duly elected:—

Barclay, Henry Ford	Mansell, Alfred
Birks, Edward	Milner, Edward
Cawdor, the Right Hon. the Earl	Nairne, Robert
Chaundler, James	Parsons, Percival John
Dickinson, Henry	Payne, George
Drax, John Samuel Wanley Sawbridge Erle, M.P.	Readwin, Thomas Allison
Fraser, Alexander	Scalia, L.
Hambro, Baron C. Joachim	Shoolbred, James, jun.
	Walmsley, Sir Joshua, M.P.
	Warren, John Loxdale

The following Institutions have been taken into Union since the last announcement:—

314. Farnham, Mechanics' Institution.
315. Newcastle-on-Tyne, Washington Chemical Works Reading Institution and Library.

The Paper read was:—

THIRD PAPER ON BRITISH AGRICULTURE, WITH SOME ACCOUNT OF HIS OWN OPERATIONS AT TIPTREE-HALL FARM.

BY JOHN JOSEPH MECHI.

Considering it to be both a public duty and public benefit to lay before the world our practice in any particular art, be it successful or unsuccessful, I venture once again to appear in your arena, feeling that it is the field on which has been fought and won, many a battle in the cause of progression and amendment. I am not here to flatter your Society, of which I have the honour to be a member; but I speak the truth, and my own sentiments when I say, that it has conferred, and that it will confer, important additions to the knowledge, comfort, and happiness of the British people.

When last I addressed you, agriculture presented an aspect of doubt and melancholy; forsaken by legislation and politics, she was abandoned to her own resources, that unknown mine from which she is now beginning to draw important and untold treasures.

On the occasion to which I allude, my celebrated Balance Sheet was held up with political triumph, or mourned over by sincere doubt and mistrust; but those times are past, never to return, so we can now breathe freely, and discourse about the strength or weakness of agriculture, unbiassed by political asperities.

I shall have to-night to present to you another Balance Sheet, and I purpose very particularly to call your attention to the new method of irrigation as practised successfully by me, involving in its consideration our water supply, sanitary condition, and physical support. The application of steam to cultivation will also deserve our notice.

However gloomy our last meeting, individually, I never despaired, and you will remember that I said, "I apprehend nobody expects that "corn will long continue at the present low "prices, such an expectation would be contrary to "all our historic evidences of fluctuations." And I also said, "No doubt, whatever the price of "food may be, the land of this kingdom will con"tinue to be cultivated; no one can seriously sup"pose for a moment that the large and active "population of this kingdom is to be unemployed "or unfed." These were bold assertions with wheat at 40s., but wheat now at near 80s. proves me to have been a true prophet.

In taking a general review of the position of British Agriculture, there is, in my opinion, nothing so fatal as congratulations on our past progressions. A good mariner looks ahead, referring to the past only as a caution for the future, as he leaves behind him the shoals of error and prejudice; let us do the same in agriculture; so long as it continues so far in the rear of perfection, I can only excuse it, I cannot praise it.

These are stirring times; in commerce, arts, and manufactures, the grand invention of to-day becomes old-fashioned and out of date to-morrow; new chemical processes may cause an immense and costly manufactory to be sold for its old materials; witness our sugar refineries, &c.

The clipper-ship and winged and tailed steamers (combined screw and paddle) condemn their log-like competitors to inferior uses, and diminished values.

So it will be in agriculture; Mr. Mechi is a most inconvenient person; he can't let old things or old prejudices alone; he is always agitating, and lets all the world know it, too. The old flail was superseded by the horse-gear threshing machine, and now the horse-gears are "trembling in the balance," by that inconvenient new comer Steam. Then there's the new American threshing machine—why, by Mr. Mechi's saying so much about it, it has suspended all the orders and bargains that were about to be made in old threshing machines all over the kingdom.

Now I don't wonder at this, for I assure you, it is an implement that will supersede all ours in cost, utility, lightness, durability, and general economy. But for all that, I have "a crow to pull with our Yankee friends."

Would you believe it, they brought over with them horse-gear to work their machine, and tell me that their "cute Agricultural friends in the States" are universally "minus steam." Of course I felt much shocked, and having attached a small portable steam-engine of four horse power

to show them the advantage over a relay of eight horses, they felt duly ashamed, and promised never again to permit horses to work their excellent machine.

I am concerned to see that still so little steam is used in our own agriculture. Every farmer with 200 to 300 acres, who has not an engine, has a great lesson to learn, and I would have him to understand, that a strong four-horse power steam engine, worked at 70lbs. to 90lbs. to the inch, will tire any sixteen real horses he can find, the comparative cost being 150*l.* against 600*l.*, besides eating nothing when not at work, occupying less space, and economizing an immense outlay in casualties by disease, cost of attendance, and daily food—six to seven hundred weight of coal, versus 32s. horse feed.

I little thought, seven years ago, that I should outlive the storm of ridicule and censure poured upon me by my practical friends. But it is gratifying to me, on personal and public grounds, to find the Mechian medicine gradually taking effect. I have often to "congratulate" my neighbours with sly gravity on their steam engines, Garrett's horse hoes, covered yards, boarded floors, and drainage of tenacious clays; waggons and board and thatched buildings are still clung to with considerable affection, but with a some doubtful and half-calculating glance, at my *new looking* brick and slated buildings, although erected ten years since.

If I meet the strong tea half a mile in advance of the farmery, after a heavy rain, and make some inquiries as to the condition of the tea leaves in the yards, glancing at the untroughed eaves, I am told "my landlord ought to do this;" and sometimes I say I suppose you would repay him interest for it?

In fact, however unpalatable and unpopular it may be to uncover and expose agricultural errors or short comings, time convinces me that it is attended with the happiest ultimate results, and I can never afford to feel angry at former censures, when I see that many a sturdy old pollard has bowed to my influence, and that many a crooked hedge and way have been made straight by my example. By the bye, is it not very singular, that whilst our railway fences are efficient, trim, and thriving, it being profitable to dig beside them annually, the lineal influence has never affected the inefficient monstrosities that diverge from them, at right angles? I now proceed to produce my Balance Sheet and I am sure most of you will rejoice with me, that it shows a most favourable and encouraging result, the benefit I derive for this year being in rent, profit, and interest, nearly 600*l.* I will say nothing of a further sum I ought to claim, for improved condition of soil, owing to my having purchased for consumption by my live stock 700*l.* worth of Corn, Oil Cake, &c. I shall have the benefit of this in next year's crop.

Dr.

	£	s.	d.	£	s.	d.
To Valuation, 31 October, 1852—						
Horses	£86	0	0			
Pigs	117	2	6			
Sheep	203	6	0			
Cattle and Cows	347	0	0			
Implements	390	12	0			
Tillages, Hay, &c	526	10	0			
				£1670	10	6
Rent of Chapel Land				45	0	0
Tythes, Rates				68	0	0
Labour, including Engineer, Bailiff, &c.				407	0	0
Guano, Bones, and Superphosphate Lime				98	0	0
Seed Corn and Seeds				45	0	0
Live Stock bought				1280	0	0
Corn and Cake bought for feeding purposes, Horses' keep, &c.				648	0	0
Coals for Engine, Tradesmen's Bills. &c.				130	0	0
				£4891	10	6
My Improved Rent, 86s. per Acre	£240	0	0			
Profit	343	16	3			
				583	16	3
				£4975	6	9

Cr.

	£	s.	d.	£	s.	d.
By valuation, 31 October, 1853—						
Horses	£74	0	0			
Pigs, &c.	255	6	0			
Sheep	448	0	0			
Cattle and Cows	239	10	0			
Implements	390	12	0			
Tillages. Hay, &c.	471	18	9			
				1879	6	9
Wheat, 3½ Quarters per Acre—50 Acres				630	0	0
Barley, 5 " " 11 "				114	0	0
Beans, 5 " " 13 "				145	0	0
Oats				10	0	0
Produce of Cows and Poultry				50	0	0
Hay Sold				55	0	0
Horse Work, Labour, Hay, Manure &c. for Private Establishment				60	0	0
Live Stock, and Wool Sold				2002	0	0
Three Stocks of Old Straw				30	0	0
				£4975	6	9

I recently incurred a brisk agricultural censure, for stating that "live stock is a necessary evil." We cannot do without it, because it produces manure, which enables us to sell grain; but, leaving out of view its manural gain, it certainly "does not pay." Those who have a fancy for keeping pigs and other animals, will find, that after paying market prices for their food, adding shelter, attendance, and casualties, there will be a considerable loss, or charge against the manure. If you have a fine crop of turnips, which, in rent, manure, labour, &c. has cost you 10*l.* per acre, and offer it on the market to be folded off for sheep, it is a great chance if you are bid 5*l.* per acre; and if the parties give their sheep oil cake whilst so feeding them, they would probably give nothing for the turnips.

These questions puzzle amateur farmers, but are well understood by the knowing old practical hands. Therefore, bear in mind, that every pound you spend in pur-

chased food, diminishes the value of your root or green crop.

My stock balance-sheet results very satisfactorily compared with my last, owing to irrigation, but had I not consumed so much purchased food, it would have been now far more favourable, although I should have been minus much manure, which may compensate me hereafter.

A Lincolnshire farmer told me a few days since, that a fine crop of turnips which cost him 10*l*. per acre, he once sold for 10s. per acre, to be fed off with sheep. This was owing to the general abundance of turnips, and the necessity for feeding them off in time for barley. The 9*l*. 10s. per acre loss would evidently become a heavy drag or charge on the barley, clover and wheat of the rotation.

Another large grazier told me, "If I buy a thousand pounds' worth of oil cake, I charge half to the bullocks, and half to the manure."

Mr. Lawes's experiments on the comparative fattening qualities of sheep, in the "Royal Agricultural Society's Journal," furnish correct data on this subject, and show that, after paying for purchased food, *nothing* was left for the turnip, although we know they cost 10s. per ton or more.

Breeding stock of first rate quality, if you have judgment and suitable land, is perhaps remunerative, although there are many expenses and anxieties attending it. As there is a great rage for poultry just now, it may be as well to say that I include them in my observations. In a farm-yard they are useful to pick up and convert the unthrashed grain, but if you buy food for them, they entail a loss.

Amateur farmers will do well to consider that ten per cent. on capital, or 1*l*. per acre, is, on an average of years, considered a fair remuneration by farmers. It is true there is house rent free, beside some other advantages, but we see a great many ruined by farming, either from want of judgment, or by unpropitious seasons. In farming, as in all trades, a want of judgment is soon found out and availed of by knowing hands, who will buy of you too cheap and sell to you too dear. Your labourers, too, will take an exact measure of your capabilities.

LIVE STOCK ACCOUNT.

Cr.	£	s.	d.	*Dr.*	£	s.	d.
To Valuation, 1852	753	8	6	By Valuation, 1853	1016	16	0
Corn, Cake, and Feeding Stuffs bought..	648	0	0	Live Stock and Wool sold. ...	2002	0	0
Live stock bought	1280	0	0				
	2681	8	6				
Profit, or rather price paid for Produce of Farm in Roots, Green Crops, and Straw consumed	337	7	6				
	£3018	16	0		£3018	16	0

Now this balance sheet opens up a vast question for reflection, both in town and country. Why is it so different from my former one?—principally because I have the power of irrigation.

It is true that prices are higher now than then, but crops are less productive, and expenses are higher. Nearly the whole difference between this balance sheet and the former one arises in the live-stock account. By irrigation I am enabled to double, if not triple, my green and root crops, and thus render them profitable instead of unprofitable. It is quite clear, that if I can double my stock, I also double the quantity of my manure, and thus affect importantly the cereal crops. If I double my green and root crops, I diminish their cost one-half. This is actually the fact, and therein is my present and most agreeable position. Every practical farmer knows that the losing part of his farm is the root crop (I mean in the Midland, Southern, and Eastern Counties, where we have hot summers and little rain). That root crop costs him more than the animals repay, and leaves a heavy charge on the ensuing grain crops. Irrigation changes all this, and permits each crop to be responsible for its own annual charge, thus rendering them all remunerative.

I am forcibly and frequently reminded of the truth of this statement by a five-acre pasture opposite my residence. Vainly did I try, by solid manures, to render this vile plastic clay into a useful pasture. It was like birdlime in winter and cast iron in summer—poor, indigenous, and drab coloured grasses choaked and eradicated the finer kinds I had sown—and the animals wandered about, hollow and dissatisfied. In the space of eighteen months irrigation has changed all this—new, fine and fattening grasses have clothed the field with perpetual verdure—it keeps three times as many animals, and the close and shaven pasture indicates their affection for it—butter, milk, and cream, alike testify by their richness to the fertility of irrigation, whilst the animals are improved in their condition.

Professor Way, in his recent valuable analysis of grasses, in the "Royal Agricultural Society's Journal," has revealed the astounding truth, that irrigated grasses contain twenty-five per cent. more meat-making matter than those not irrigated.

We all know that grasses are voracious drinkers—they cannot stand drowning on undrained land in stagnant water, from which their roots soon extract all the oxygen; but see how prim and green they look beside any trickling rivulet. I venture, therefore, to predict, that the people of this country will soon connect ample water-supply, cleanliness, and health, with the idea of ample and cheap physical supplies—they will identify the well-washed contents of their closets with rounds of beef, saddles of mutton, big leaves, and rich milk. The ladies, will recognise in every slop that leaves the house, a rich, cheaper, and more abundant supply of that element, milk, which is to develope in their offspring by bone and muscle, beauty and power, mental and physical.

In these times of advancement and common sense, let us call things by their proper names. The light of science has dispelled the darkness of our ignorance on these subjects. We know by our great chemists, that our sewers contain the elements of our food—of, in fact, our very selves—and that to waste them, as we now do, is a cruel robbery on the welfare and happiness of our people.

Practical experience has taught me that this sewerage is all the better for ample dilution—that the more you flood your cities with limped streams, washing from every tainted and poverty-stricken court and alley the elements of pestilence and suffering, the grateful earth will absorb them in her bosom, and return them to you as treasures of health and strength. I feel strongly that the time is come when the sanitary condition of two millions and a half of people can no longer be held in abeyance by paltry vested interests.

We have in this country an estimated 15,000,000 of acres of grass-land. We know full well by our London milk, and by the appearance of the pastures on our London clay, that they require and are capable of enormous improvement.

This can only be profitably done by draining them and saturating them to the depth of the drains with the sewerage of our towns and cities; this is already in a few instances, being done, and will result in enormous profit to those far-sighted men who have anticipated the general adoption of the system.

The difficulties are insignificant; they exist in the *brain*, not in the fact. It is of no use to send a stream of sewerage to a farmer who allows his own manure to run down the ditches, and sends to Peru to bring it back again in the shape of birds' dung at 10*l* per ton. No! landlords and tenants too must be taught or brought to believe that food and liquified manure are one and the same thing, merely altered in form. Then you may make a small well by the side of each present sewer, and with your steam force pump take *all* that comes down that source, and distribute it through subterranean arterial pipes on the whole country; not a drop need run past your pump to taint your streams. There is no more difficulty in it, than in the water supply, but you must work a change in the minds of the agriculturists, or they will hardly take it as a gift, much less pay you for it.

Our General Board of Health has done wonders in this matter. I for one, shall ever feel that the country owes to the philanthropic, talented, and energetic members of that board a deep debt of gratitude, for their exertions in a most unthankful and unpopular cause. We none of us like physic, however good it may be for us, and sanitary doctors are no favourites with rate-payers, although they can clearly have no other interest than the public welfare.

When I speak of liquified manure, I must be understood as meaning all excrementitious matter, solid or liquid, rendered fluid or semi-fluid by the addition of water, or by decomposition in water. In dealing with large quantities of such decomposing matter, a disagreeable and unhealthy effluvia will arise, however small the trap or cover of the tank; but experience has at length taught me that a jet of waste steam admitted into the tank above the agitated mass of putrifaction, effectually prevents any noisome odour. Vain are all other antidotes compared with this cheap and simple remedy.

The effects of liquified manure are so striking in improving our crops, that the cause is worth tracing. We know that there is nothing of which a farmer is so much afraid as the subsoil six or seven inches below the surface; if he brings this at once to the surface, he will grow nothing for some time. This proves clearly that that dreaded subsoil has never received, or been improved by the solid manure ploughed in to the surface soil; but by applying the solid manure in a liquified form, it sinks deeply into the subsoil, saturating every granule, and by a thousand affectionate affinities improves its chemical condition, rendering its particles available and agreeable to the fibres of plants; change of air, and change of water, are as necessary to roots of plants as to living animals; all this is effected by drainage and irrigation. It is no uncommon thing for us to saturate the soil to the depth of five feet in the very strongest clays, making the drains run with the precious fluid, diminished of course in strength and value. The specific gravity and temperature of liquified manure are much higher than those of ordinary water, thereby warming the cold and inanimate subsoil—we know the effect of bottom heat in our gardens. It is a significant fact that the liquid excrement of animals in dry weather destroys vegetation—dilute it well, as in our sewers, then it stimulates and fertilizes.

If we believe that chemical action is the parent of heat, and that it is also electricity, it is easy to comprehend, that great chemical disturbance takes place in the cold subsoil, by the introduction of manure in a liquified and fermenting condition, and consequently there must be a much greater amount of bottom heat. This is actually the fact, for the irrigated grasses, both natural and artificial, retain their verdure through the winter, whilst those un-irrigated have a brown withered appearance.

Experience has taught our farmers, that the ammoniacal portion of our manures is the most costly, and yet the most difficult to retain; owing to its extreme volatility, admixture with water is the only profitable way to prevent its escape into the atmosphere, therefore the washing away of the fresh-made manure into a copious tank for irrigation, is in every way a great economy and advantage. Science has taught us, that the earth is as necessary a composition of plants, as air, water, and manure. It has also recently been shown by Mr. Way's experiments, as recorded in the "Royal Agricultural Society's Journal." that nothing will dissolve the silica, or hardest part of our earth, so readily as ammonia. Hence the necessity for its economy, if we are to grow grain crops more frequently and abundantly than we used to do; for, as you are no doubt aware, the glass coating on the straw of our cereals is a solution of silica, which is necessary, not only as a mechanical support, but as a protection to the vitality and circulation of the juices of the plant. I really believe, that many of our spongy laid cereal crops may be traced to a want of soluble silica, the ammonia that should have dissolved it having escaped during the wasteful process of dung-heaps, or washed away by the rain from the untroughed farm buildings.

As this is a general discourse, I will not overlay it with tedious statistics of cost, but will state generally that to irrigate a farm of 200 acres, you would require:—

Four-horse steam power, worked at sixty to seventy pounds per inch.

Fifteen yards per acre of three-inch iron pipe.

A circular tank, about thirty feet in diameter, and twenty feet deep.

Two hundred yards of two-inch Gutta Percha hose, with corrugated joints to render it flexible.

Gutta Percha jet.

A pair of force pumps, capable of discharging 100 gallons per minute. (Mine are of five-inch diameter, and twenty-inch stroke, making thirty strokes per minute; but I would recommend larger barrels, and a slower action, to prevent wear and tear.)

At present prices, all this can be accomplished for about £6 per acre, so that the tenant paying 9s. per acre to his landlord for such an improvement, would be a great gainer.

For more comprehensive details of the whole system, I would refer you to the excellent "Minutes of Information of Sewerage as applied to Agriculture," issued by the Board of Health, and obtainable at the Queen's Printing Office, which every one interested should read.

It is a curious and interesting fact, that while solid manure breeds animalculæ, liquified manure destroys them. Many fields of tares have been eaten by slugs this autumn, and so would mine, but for the discomfiting ammoniacal shower. The losses by wire-worm and slug are very serious, and are well worth preventing.

The question of economizing the sewerage of our towns and cities, will soon force itself upon our landowners and agriculturists. Admiral Moresby's recent announcement, that the guano supply will be exhausted in ten years, will bring the matter to a crisis; our annual supply of 200,000 tons may be said to produce two million quarters of corn, or its equivalent in meat, &c., with an increased population, such a deprivation will compel us to look after our own guano.

The waste of manure, and many other of our agricultural short-comings, arises from a want of knowledge. The more landlords and tenants understand the science of agriculture, the better will be their practice; and I regret that there are not yet, in each county, one or more Agricultural Colleges, on the principle of that excellent Institution, now so firmly established at Cirencester.

We find, in many of our Midland and Southern districts, agricultural reform administered by Scotchmen, because their views are more enlightened by scientific education.

While touching on irrigation, it may be useful to consider drainage, with which it has a close connection. Of

course, without drainage, natural or artificial irrigation would be injurious. A smart discussion has recently been carried on, whether drains should cross the slope angularly, or follow the natural fall in equi-distant lines. There can be no doubt as to the necessity for tapping sand or peat pots, or other natural and free receivers of water, when surrounded by tenacious clays. Up and down drains will generally do this, but where they do not, lateral branches may be added. Although close and shallow drains may make the land appear somewhat more dry during winter, the crops on the deeply drained land show a superiority in the summer. As so dense a fluid as liquified manure will filter deeply (five feet) through the heaviest clays, and flow from the pipes in streams, I hope we shall never again hear the too common assertion that "water won't go through our soils."

I place before you the model of a steam cultivator, which I think is about to introduce a new economy in British agriculture. I have become as it were a parent to it against my inclination. Mr. Romaine, the intelligent *inventor*, was consigned to me by the Agricultural Department of the Canadian government, who had a high opinion of it. After trying in vain to interest some of our implement makers in this invention, I found that it would be lost to agriculture, unless I advanced the necessary funds for its manufacture, and for the securing of the various patents. On public grounds, I did this, and happy I am to say that its success promises all that the inventor anticipated. If, with the assistance of a pair of horses and 5s. worth of coke, we can effectually comminute and cultivate ten acres per day, we may bid farewell to the whole tribe of tormentors, scarifiers, grubbers, harrows, broadshares and clod-crushers, that consume, through our horses, so much of the food of this country. If it does not supersede the plough, it will limit its operations. When once the steam cultivator is shown to answer, no doubt many others will appear and I venture to predict, that within seven years, steam will become the grand motive cultivating power. I also exhibit drawings of Mr. Usher's steam-plough; great credit is due to that gentleman, and I trust and believe it will answer his expectations, and be a great agricultural economy, on level land.

You will perceive by the models and drawings, that each of these implements may be compared to a steam-vessel on land instead of water. The internal steam-power causes the paddles or wheel-cultivators to revolve against the earth, and the resistance offered by the latter to the power exerted, causes the machine to be propelled.

You will also see, that Mr. Romaine's machine will if required, deposit the seed and roll the land at one and the same time. These may be called dry-weather implements.

Every heavy-land farmer will easily appreciate the advantage of being able to complete his cultivation during the long and bright days, when the land works and admixes well. Steam, which never tires, will enable him to do this; and he will no longer be pained by seeing his exhausted horses brought home at two or three o'clock in the day, deferring his cultivation until the rains and fogs of November convert his aluminous clays into putty or birdlime.

If these machines answer, I see no reason why they should not be made sufficiently powerful to do thirty or forty acres, or even 100 acres per day. I have no doubt that we shall see on our land what we now see on the wide ocean, monstrous moving volcanoes, rendered by science useful and subservient to man, each representing the powers of some thousands of horses, which we shall feed with coals instead of corn. Adieu, then, to small fields and narrow lanes.

I would state, that Mr. Romaine's engine, when not cultivating, will be available for driving the thrashing machine, mill-stones, irrigating pumps, chaff and turnip cutters, cake-breakers, &c., requisite on most improved farms. It is also intended to work a reaper at harvest.

As it is highly important to concentrate great power with little weight, I have adopted Mr. Barran's Patent Cupped Boiler, which presenting a much larger area of fire-box surface to the water, economises fuel, by a much more rapid generation of steam. I have no doubt we shall soon find it applied to locomotives; the one I have is the first that has been issued—I have proved it to 270lbs. per inch, and shall work it at from 100lbs. to 140lbs. To appreciate the great advantage of steam over horse power, we must reflect that an express engine weighing thirty-eight tons, represents the power of 1000 real horses, which would weigh 750 tons. It is gratifying to me to be able to state that my engine driver is one of my farm labourers, who works the engine, irrigation pumps, and other machinery, perfectly to my satisfaction. The fact is, *all* the men on the farm soon get used to the steam, and you may easiliy select one or more with a particular pride in its management. A forge hammer, anvil, vice, tongs, flat and round files, &c., are a necessity of the situation —so you make a blacksmith, as well as an engine driver.

We can many of us remember that nearly all our great inventions have had to struggle into public favour against an amazing force of custom or prejudice; steam power, gas, steam travelling by land and sea, and the electric telegraph, were all declared impossibilities and absurdities; even now, fifty years have not sufficed to impress upon the agricultural mind the great economic fact that steam is cheaper and more profitable and available than horse power.

There is a great advantage in prejudice or attachment to old and tried customs, but it becomes hurtful when it blinds us to the superiority of novel excellence.

In conclusion, permit me to say, that a dense, prosperous, and increasing population, spread over a limited and unextendable area, demands and will necessitate a more expensive and productive practice in agriculture than is now generally adopted: the investiture of more knowledge, capital, skill, and progression, both on the part of the landlord and tenant, has become a necessity of our times. Our labourers must be educated somehow; our country blacksmiths must become engineers, capable at any rate of comprehending and repairing the defects of our engines.

Mighty and restless steam, which is forcing its way into every village, and disturbing rural placidity, will awaken and command reflection, and develop intelligent action. The walls of our village schools (where we have any) will soon exhibit for the precocious aspirant to steam management, diagrams of the mechanical intellectuality of that universal agitator; and here I may observe, in my own parish, with an area of 5,000 acres and a population of 1,500, all that was raised, until recently, for education, was 15*l*. a-year. We must *follow* our Scotch friends at a respectful distance in this respect, for there every farmery protrudes its shaft as a sign of the intellect developed by that wise law, which afore-time *compelled* the heritor or landowner to educate the people on his property, and had thus fixed in their breasts that love of knowledge, for which our "cannie" friends are so distinguished. Landowners have now no excuse for want of capital; eager and intelligent companies, duly legalised, will cheerfully effect, with their subscribed capitals, every agricultural improvement, in a manner advantageous alike to the landlord, tenant, and nation at large. Happy indeed is it, that such operations promote the national tranquillity by employment, and create new consumers for the increased produce, both of agriculture and manufactures.

But before all the improvements necessitated by our altered condition, can take place, there must be a thorough reform of our present absurd, clumsy, dilatory, and costly mode of transferring land. I really believe it would benefit gentlemen of the law, for now (and I speak practically in this matter) a man of business avoids land, except as a permanent investment, or if he does purchase,

takes especial care to avoid a separation from it as long as possible. I purchased the other day three acres of land that intersected my fields, and was highly amused at the production of as many parchments and documents, as, when spread out, would cover the great charity dinner table at the London Tavern. After travelling back seventy-five years to trace the enclosure or kidnapping of this piece from a heath, it traced the death of the parties, their wills, their successors' wills, three or four mortgages several times transferred, and a mass of writing out of which any clever lawyer could, I should think, extract fifty objections. Apply the same principle to our funded, and every other description of property, and we should come to a dead fix, like the Irish encumbered estates. Like those, the very absurdity of the evil will, I fancy, some day work its cure. It certainly keeps down the price of land, by greatly diminishing the competition for it.

If, as I believe, such meetings as these tend to reflection, comparison, and amendment, for the general welfare, I retire from you, satisfied with having contributed my mite towards the good cause of agricultural improvement.

DISCUSSION.

Mr. Varley wished, as a great deal had been said in the paper about deodorizers, to ask whether Mr. Mechi had ever employed a preparation of chloride of zinc. He asked the question, because zinc was highly deleterious and poisonous, whilst iron was not so.

Mr. Mechi had not done so, though he had tried a great many deodorizers. He had used sulphuric acid, and had thrown two or three carboys into his tank at a time; but he found the best deodorizer to be composed of water, combined with the jet of steam.

The Chairman, whilst they were on the subject of deodorizers, might be allowed to relate an anecdote relative to what had taken place at Annerley. They might all have observed, near the Annerley station of the Brighton Railway, a large, handsome brick building, that was the Industrial School of the East Surrey Union. In that establishment nearly all the work was performed by children, who, instead of growing up paupers, were trained in habits of industry, by which they might become useful members of society. There were altogether about 1,000 persons in the establishment, and every kind of matter was collected in the tank, thence to be distributed over the land as liquid manure. He did not exactly recollect the extent of the land, but more matter was collected than was required, and the overflow was allowed to run away. This caused a nuisance in the neighbourhood, and the London and Brighton Railway Company threatened the Guardians with an action, in consequence of the matter flowing by their line. They accordingly set to work to devise means to get rid of the nuisance, and they placed at the bottom of the tank a bed of peat charcoal; over this they placed a covering of perforated wood, through which the sewerage water percolated, whilst the solid matter was retained. The result was that the water came out so pure, that an official friend of his—one, indeed, who had recommended the trial, saw a pic-nic party help themselves to water from the stream which ran from the tank.

Mr. Mechi would remind them that though the smell of the water would be taken out by the means stated, the valuable manurial properties would still be retained; and the party were therefore drinking water which would probably have been more beneficial to them in another way. Before he used the steam-jet in his tank, if there was the slightest fissure between the planks with which his tank was covered, the putrid mass could be smelt at a distance of 100 or 200 yards; but by just throwing a little waste steam into the tank the vapour was cooked, and the smell entirely destroyed.

Mr. Cooper had heard with great interest that portion of Mr. Mechi's paper in which he mentioned the necessity of a good supply of silica to preserve the wheat; and he would ask that gentleman whether he had ever turned his attention to silica in solution as an agricultural agent. He believed that a silicate of soda was not difficult to be obtained, and might be of great use.

Mr. Mechi was aware that Mr. Payne and Professor Way had found silica in a solid condition in Surrey. He believed, however, it could not well be used in solution, as, when exposed to the atmosphere, it soon became solid.

Mr. Cooper believed that a silicate of soda was now being prepared by submitting it to a temperature of 300 or 400 degrees, which would not become solid by exposure to the atmosphere.

Mr. Warren might mention that a silicate of soda was now prepared for calico manufacturers, which did not require a high temperature, as warm water readily dissolved it. It was used for the purposes for which cow-dung was formerly employed. At one time, in order to prepare calico for the dye-tub, it was usual to pass it through a mixture of cow-dung and water. It was found, however, that by the use of the silicate of soda the mordaunts were prevented running, and the calico took the dye better. He did not know its exact price. It must be cheap, in consequence of its having superseded the use of cow-dung.

Mr. Davis had hoped that some of their agricultural friends would have risen and tried to pull Mr. Mechi's balance sheet to pieces; but as they had not done so, he would make a few remarks on a very important subject alluded to by that gentleman—irrigation. He regretted that he had not brought certain papers with him, which would have fully confirmed Mr. Mechi's views with regard to its importance, as proved by a gentleman in the West of Scotland who had followed the example of Mr. Kennedy, of Ayr, who Mr. Mechi would acknowledge to be the first person who had extensively resorted to irrigation. The gentleman he alluded to only commenced operations in February. He possessed thirty acres of land, and he allowed 2lbs. of cake per day to each of his beasts, and ¼lb. to his sheep. He had fifty head of horned stock, and two hundred and one sheep; and after charging ten per cent. on the cost of his pipes and machinery, interest on his outlay for stock, the rent of the land, and every other expense, he found that he had made a very handsome profit. The experiment was made by a landlord, because no one would take land in the West of Scotland for the purpose, though in his opinion it should always be left to the tenant to develope the resources of the land, the owner only receiving a rent for it. Well, if that gentleman's stock were now to be sold off, he would be in a position by which he would clear a profit of 4*l*. 17s. per acre, or nearly 150*l*. on thirty acres of land. He was sure that agriculturists generally knew very little of the great value of proper irrigation of the land. Mr. Kennedy began his operations with only five acres of land, and he had now 140; and though it was but poor land, he fattened six beasts and eight sheep to the acre, and his stock, if sold off, would produce 12,000*l*. Mr. Kennedy had two roups or sales a year, at which he sold about 200 head of cattle and 400 or 500 sheep, all at a remunerative price. He considered they were deeply indebted to Mr. Mechi for his experiments and bringing this matter forward; and it was only a few days ago he had told some Kentish farmers that they did not mind spending money to come up to London to look at fat beasts, whilst it would be much more profitable for them to inquire how they were fattened. He believed that if Mr. Mechi had made a profit, he had made it by irrigation alone, and he could assure them the example was well worth copying.

The Chairman might be allowed to call attention to the success which had attended the efforts of a poor man, with a village allotment of only 10 poles, or the sixteenth part of an acre. He was an omnibus-driver, employed from 8 o'clock in the morning until 10 at night; and the only time he had to cultivate his ground, was before he

commenced his labours of a morning. He was not a skilled man, but he had used liquid manure to his ground, not perhaps quite so much diluted as it ought to be, and the result had been that he produced green vegetables sufficient for his family, consisting of himself, wife, and eight children, throughout the year, and potatoes for all but six weeks, when they had an abundant supply of the other vegetables, so that even in his rude way this man was producing at the rate of sufficient vegetable food for 100 persons per acre. He felt great interest in that part of Mr. Mechi's address in which he spoke of the necessity of educating the labourers; because he felt that they could never successfully apply improved processes either to manufactures or agriculture unless they improved the education of the people. He could scarcely have imagined that there could have been a parish in the kingdom, where the people had an opportunity of observing Mr. Mechi's energy and improvements, without being fully alive to the necessity of improving the education of the labourers. He would take the liberty, now that he had found the defect was about to be removed, to suggest to Mr. Mechi to endeavour to form a connection between his own farm and the school. In some parts of the country, where the children were being educated in the theory of agriculture, they were allowed to work upon neighbouring farms, where they gave the greatest satisfaction. Farmers who were at first opposed to the experiment, were now not only reconciled to it, but were anxious to obtain the services of the children.

Mr. Cole, C.B., wished to say a few words on the subject of education. Mr. Mechi had said that in his parish only 15*l*. a year had been given towards the education of the children. Now he should like to call his attention to the success which had attended an experiment of the Dean of Hereford, with an agricultural school, in the parish of King Somborne, which had become self-supporting, as he thought similar success might attend a similar experiment in Essex. Of course capital must be found in the first instance to start these schools, but he believed they might afterwards be made self-supporting. There were one or two other points in Mr. Mechi's paper worthy of notice. That gentleman said there need be "no excuse for want of capital." He agreed with him that there need be no want of capital; but the great objection private companies had to contend with in raising money was the unlimited liability which rendered one man's property liable for all the debts of a company. If that could be got rid of, there would be no difficulty in obtaining capital; and he was glad to see by their Journal that the Council of the Society of Arts, having felt the pressure of the law, were about to take it into their consideration; for, if unlimited liability were got rid of, he believed there was no speculation in which great companies could so freely and profitably engage as in promoting improvements in agriculture. He would only refer to the success which had attended the efforts to get rid of "chaff-wax" and other expensive forms as regarded the patent laws, to express a hope that Mr. Mechi's account of the number of papers required to transfer a little bit of land would sink deep into the minds of those who read it, and make such an effect that shortly we should get a simple way of transferring land, as easily as 100*l*. stock, or any other commodity of interchange.

Dr. Lyon Playfair begged to be allowed to bring back the attention of the meeting to the subject really before them. They all knew that Mr. Mechi had long been engaged in experiments in agriculture, some of which had no doubt failed. There was not a philosopher who had not failed one hundred times over in his experiments, and who counted his failures as so many triumphs, because he was thereby made acquainted with the laws of nature and the path which he must avoid. Mr. Mechi had asked nature, by his experiments, several questions which she had refused to answer, but on the question of irrigation he had received a simple and natural answer. They had known long since that plants could not take solid food,—that it was not suited for the pores of their roots. However impalpable the powder applied, it was found the solid food was not suited for plants. The only way that plants derived their means of sustenance was from oxygen gas; the leaves took in the gas from the air, and the agriculturist must supply the oxygen to the roots, and the only true and sensible plan was by diluted manure. Then, as regarded another important point—the extent of dilution,—there was a very easy explanation on chemical principles. The land, when in its red condition, contained iron—and if they did not sufficiently reduce their manure it would convert the land into a blue condition, when it became poisonous to the plants. But if large masses of decaying matter were extensively diluted, the oxygen in the water, as it were, burnt the decaying matter, and converted it into a useful and valuable manure; therefore, the more they diluted it the more valuable it became. The object, then, of washing drains was not to carry away the soil, but to clear it from foreign matters, and to render it valuable for agricultural purposes. If they filtered it through the land, no matter how badly the water was put in, it would come out clear. All philosophy urged them thus to study the habits and condition of the soil before applying their manure. It was most important that 1 lb. of liquid manure should produce 1 lb. of wheat—and with proper management it would, no doubt, do so. There was another point on which he wished to make a few observations: Mr. Mechi had got over the ridicule and abuse with which he had been originally assailed, but he had lately opened up a new vein in the same great mine, and he must be content to be again abused for proposing to reduce agriculture to a mere manufacturing process. He had shown that, by the application of horse or manual power to the plough, only a certain force could be obtained, whilst a great additional force could be procured from coal. But put them on an equality, and the question arose, was it cheaper to burn a pound of flesh or a pound of coal to obtain their force—for, in the case of the flesh, there must be the exhaustion attendant on the labour, whilst, in the coal, they knew how it was destroyed. As a pound of coal was cheaper, then, than a pound of flesh, they would see the advantage of the former over the latter, whilst at the same time the carbon produced by the burning of the coal was larger than that engendered by the burning of the pound of flesh. The application of steam to the plough would no doubt be of great importance in preparing and percolating the ground, and in what had recently been done by Mr. Mechi and others they had seen the advantage of science combined with practice—for hitherto they had had too much science without practice. In this respect he looked upon the Agricultural Society as having done very little for the improvement of agriculture. There had been no education to render the science available—the scientific men had had no practice, and the practical men no science. If they educated the people and made them understand the advantages of these improvements, they might depend upon it they would live to see the time when they would obtain a bloodless victory, so that the extended domains of Queen Victoria would produce abundance of food for a population which he hoped would be greatly increased.

Mr. C. H. Smith would just make one remark relative to the balance-sheet of Mr. Mechi, and what had been said relative to the cost of silex as too expensive for general use. He hoped that no such consideration would prevent gentlemen like Mr. Mechi from experimenting with any article, as all experience proved that, as the demand for an article rose, new processes of preparation were discovered, and the cost was lessened.

The Secretary announced that an Extraordinary Meeting would be held on Monday, the 19th inst., at seven o'clock, p.m. precisely, for the purpose of resuming the discussion "On the Consumption of Smoke," when it was hoped that

attention would chiefly be directed to the difficulties which the furnaces employed in various trades and manufactures imposed to the application of this plan, and how far these difficulties might be overcome.

Also, that at the meeting of Wednesday next, the 21st inst, Mr. Horace Green would read a paper "On Pettitt's Fisheries Guano."

Also, that the Council had determined to hold an Exhibition of Recent Specimens of Chromo-Lithography and Colour Printing, when the specimens of "Naturselbstdruck," from Vienna, would be shown. This Exhibition would be opened to the public on Thursday, the 29th inst. The private view will take place on the evening of Wednesday, the 28th inst., for which a card of admission, to admit himself and lady, will be sent to each member.

PEARLS AND PEARL-MAKING IN CHINA.

BY D. T. MACGOWAN, M.D.

COMMUNICATED BY H. E. JOHN BOWRING, LL.D., H. B. M. PLENIPOTENTIARY IN CHINA.

Goethe, whose claims to distinction in the scientific world have been imperfectly appreciated, owing to his greater poetic renown (himself a discoverer), attributes discoveries to the age rather than to individuals, thereby detracting more credit from the cultivators of science than many will be willing to concede; for, besides simultaneity of inventions and discoveries, there are not a few of widely different dates which have been identical and independent. The method of producing pearls artificially, as well also as the art of manufacturing spurious ones, afford instances among many that might be adduced from the annals of science and art in illustration of this fact. A history, embracing re-discoveries and simultaneous ones, including inventions pertaining to the same category, would present a curious and instructive chapter in the records of the human race, while it would show that the domain of knowledge has oftener than is generally supposed been explored in the same direction, and with like success, by different persons (both contemporaneous and otherwise), who are equally entitled to the credit of originality.

Priority in the mere discovery of pearls is an honour which none will contend for, as it required neither genius nor sagacity. Mankind could not have indulged long in molluscous food without meeting with these animal gems. In the "Shúking," one of the most ancient books of China, it is stated that pearls were sent to Court as tribute, from an adjacent state, now forming the N.E. portion of the province of Kiangsú. The earliest of dictionaries compiled by Duke Chau (the inventor of the compass) eleven centuries before our era, enumerates pearls as one of the precious productions of Shensi. They, too, have been obtained in most abundance from the river Hwaí, Nganhwin; but this much admired ornament has been found in all parts of Eastern Asia, from the Himalayas to the Pacific, and from Manchuria to the Straits, being in requisition for the decoration of shoes, girdles, earrings, necklaces, and head-dresses, and for the embellishment of popular divinities. There may now be seen at the Buddhist island of Puto a golden image of the Goddess of Mercy, the gift of the Emperor Kanghi, about five inches high, the trunk of which, when exposed, displays a large lustrous pearl, the pearl whence she ascended to the skies. The frequent mention of pearls in Chinese history shows the value set upon them by the Imperial Court, and by all who were ambitious of adorning their persons: the introduction of some of these references in this place will not be inappropriate.

A pearl dealer at Shauking (an ancient city between Hangchau and Ningpo) was commissioned by the Empress (202 B.C.) to procure a pearl three inches in circumference, which he succeeded in obtaining, and for which he was paid 500 pieces of silver (1500 dols.); whereupon an envious princess secretly managed, by offering a larger reward, to procure one from the same person an inch larger. The reigning Emperor, a century before our era, sent a messenger to the sea to purchase "Moon Pearls," the largest of which was two inches in circumference. At a later period one was brought to Court as large as a plum; these were doubtless imported from India. It is stated that about this period there were some pearls in possession of the Emperor so lustrous as to be visible at a third of a mile distant; and one—a perfect Koh-i-noor—the size of a man's fist, was so brilliant, as to be visible in the dark at the distance of three miles! It was found in Yangchau, in the province of Kiangsú.

Allusion is made to the destruction, by fire, of a Jewish temple, about 140 years before our era, in which pearls were so profusely employed in making screens or curtains, that for ages afterwards these gems might be found in the ruins! An interesting archæological fact.

Pearls of various sizes were frequently brought to court from Amoy, whither they came from Ceylon. One of these, sent as a tribute, possessed such extraordinary splendour as to illuminate a room: but its brilliancy totally disappeared at the close of three years after its reception—a curious and well attested instance of intermolecular change.

Analogous instances of pearls undergoing decomposition might be adduced, particularly in cases where light has been excluded, and they have been exposed to moisture. It is probably in consequence of their perishable nature that none of these oriental gems have been discovered by Layard or Botta in disinterring the palaces of Assyria.

Mingtí, a monarch of the early part of the tenth century, celebrated for his extravagance, had such a profusion of pearls ornamenting his canopy, the trappings of his horses and chariot, and decorating his person and the persons of his nobles, that the road was often strewn with the gems which the gorgeous *cortege* dropped in its train.

A singular anecdote is recorded of an embassy bringing tribute from Chulien (the name, probably, of a Malayan state) in the reign of Jingtsung, A.D. 1023. The embassy petitioned for permission to practice a custom of their country, in their expected audience with the Emperor, called "Scattering in the Palace." It was conceded. One of their number approached the side of the imperial hall, where he knelt, and holding up a golden charger in the form of a lotus, which contained a large number of assorted pearls, he scattered the contents on the floor in front of the Emperor, according to the most respectful custom of his native land. The attendants swept up above ten *liang* (nearly a pound) of pearls, which the Emperor divided amongst his officers. A somewhat similar display of oriental magnificence was exhibited in the preceding reign, by an embassy from the state whose king is called Shih lo chay in tó ló, and whose ambassador was Pah tó lí. The tribute-bearers brought a letter written with gold, a cap, and a garment composed of strings of pearls, and also 105 *liang* of pearls of various sizes.

Manchuria seems to have contributed to supply the Court of Peking with these coveted ornaments, ere its hardy adventurers subjugated to their sway the black-haired race. We find when they had fought their way from vassalage to independence, and were dictating terms of peace to the Chinese government, that one of the conditions was the interchange of the most valuable productions of each country. They proposed that the Chinese should make them presents annually of 10,000 taels of gold, 100,000 taels of silver, 100,000 pieces

of silk, and 100,000 pieces of cotton cloth; the Manchus presenting in turn 1000 sable skins, 1000 pounds of ginseng, and ten "oriental pearls." They reckoned their prowess rather high, or greatly overrated the relative value of the courtly presents.

The facility with which the Dual theory may be applied to phenomena of nature, enables Chinese philosophers to explain very satisfactorily to themselves whatever comes under their observation. Pearls are summarily disposed of as the female portion of the male principle, or more briefly as the female principle of muscles. They are regarded as a charm against fire, and are supposed to abound when good emperors reign. Buddhist authors say that they come from the brain of the fabled dragon, and give various Indian legends respecting moní (money?) pearls, the light of which was so strong that rice could be cooked by them. The Tauists, who like our mediaeval alchymists, long sought to discover a method of transmuting metals, and who too were in eager quest of the elixir of immortality, tried many experiments with pearls, which frequently formed an ingredient in the formula for confering perpetual youth. The following is from a standard authority: "Take a pearl which has been worn on the body a long time, of an inch or more long; steep it in wort, and it will dissolve like quicksilver: or use floating (pumice?) stones and honey-comb, and mix with the gall of a serpent, and the pearl may be drawn out to the length of three or four feet. Make it into pills, and swallow them, henceforth food will be unnecessary;" immortality will have been attained. It is not long since that pearls ceased to be used in the West as a medicine, and as might be expected they still hold an important place in the Materia Medica of China.

Amidst many puerile and superstitious notions regarding the nature of pearls, we meet with a shrewd old writer, who had at least an idea of their true character, for he states that they are the result of diseased action in the shell, anticipating the discovery of a Danish naturalist, as the latter anticipated the rediscovery of Sir Everard Hone, of their being "the abortive eggs of oysters, enveloped in their own nacre." This, however accounts only for those found within the mantle, those which are attached to, or in contact with the shell, are occasioned by the intrusion of foreign bodies, and resemble exostosis in animals of a higher degree of organization. There are several places in the "Yellow river which have furnished pearls of a reddish hue; white lustrous ones are found in clear running water, while those of a dark colour are met with in still turbid water." In Japan there are said to be splendid green specimens of the gem; the inlaid nacre work of that country certainly far excels that of any other land. A Chinese author says that the art of inlaying mother of pearl was introduced from that country.

The practice of burying pearls with the dead must have been, if it is not at present, very common, as Chinese ingenuity has been exercised in devising methods for restoring the lustre of those found in tombs. The following directions are from a Handbook of Arts, for removing the discoloration occasioned by gaseous emanations of decomposing bodies: "Take the watery extract of *yih ming* grass, and some roasted wheat; put them with the stained pearls into a silken bag, and work them in the hands until the white colour is restored." Several works quoted in the Encyclopædia (Keh Chí King Yuen), from which most of the foregoing information has been drawn, contain notices respecting pearl fisheries in the south of the Canton province, in the department of Lienchau, near the city of Hóhpú, on an adjacent island. The principal fishery is in an unfathomable lake, supposed to have a subterranean connection with the sea, being apparently the crater of an extinct volcano.

The fishing season commences in April, when the diver and others engaged in the business, first conciliate the gods by presenting the five sacrificial animals—horses, kine, sheep, swine, and fowls; paper images of some of these being economically substituted, as equally acceptable in the religious ceremony. In default of this sacrifice, the winds and waves were thought likely to be unpropitious, or monster fish which throng the waters would be encountered. The natives of that part of the coast are represented as rude barbarians, and as all but amphibious, being expert divers from childhood. Provided with a knife to separate the shells, which adhere to rocks, and with a basket for storing his spoils, the hunter of the deep is let down from a vessel by a rope fastened to his waist, and by which he is drawn up at a given signal. There was considerable difference in the quantity obtained from year to year; and then, again, during some seasons, skarks were so numerous as to cause great loss of life amongst the divers: the sea was often reddened with their blood, and their companions on drawing up the rope would find attached to it but a portion of body. At length the business became so perilous from this cause, that diving was relinquished for dredging; first, a simple rake being employed, and subsequently a scoop trailed along between two boats, by which shells were gathered in great numbers. Indeed it is likely that the method was so effective as to exhaust the supply, since there does not appear to have been any pearl fisheries on that coast after the arrival of Europeans in China. Dredging was resorted to at the beginning of the sixteenth century. At one period the fishery was of such importance, that a pearl inspector was appointed by the viceroy of Canton, to receive a share for government, or to levy a tax on the business; that officer, however, found it no easy matter to prevent fraud; despite his vigilance, and that of his subordinates, the divers would, when below, cut open the shells, extract the pearls, and conceal them in their mouths. One writer speaks of having been in the collector's office, when several panniers of shells were brought in; these were attached to a kind of tree, resembling a branch of the willow, which grew amongst the stones, and having as it were shells for their fruit. Frequently, the pearls from the Canton fisheries were of the size of peas, some were as big as a "bolus;" but generally, however, they were like a grain of millet. The "pearl-womb," as the mantles or flesh of the oyster (*Meleagrina Margaritifirera*) is called, are strung together and dried, and, when cooked with cassia buds, are eaten with rice: numerous minute pearls are often found in their substance during mastication. There is no evidence of the existence, at any period, of any other pearl fisheries in China to be met with in native works. Polo mentions that in the province of Kandu—by which is probably meant a portion of Yunan—there was a lake which abounded in pearls, and to such an extent that their gathering was forbidden to all save the monarch, lest they should become so common as to be valueless. As the great traveller was frequently led into error by his Mongolian informants, and sometimes he himself exaggerated, this is doubtless an instance of one or the other of these cases. It should be added, however, that Père Martini enumerates pearls among the productions of that part of the empire.

Arabian ingenuity was perhaps the first to be exercised in forming spurious pearls, but there is much uncertainty respecting the mode, and some doubts as to the fact itself. Allusion is made in the beginning of the seventh century to a Chinese artist, who, by a peculiar composition, made pearls of the same colour and brightness as the genuine gem. The method was not divulged: probably the art was lost, for those who now practice it, state that it became known about the middle of the sixteenth century, and is substantially the same as that invented by Jacquin, a French artist, in the reign of Henry IV.—that is, about a hundred years later than the Chinaman.

The scales of a fresh-water fish, the *Cyprinus gibelio*, are stirred in water and macerated for twelve hours, when the nacre-like substance which gives lustre and beauty to their upper surface separates, and falls to the bottom of the vessel, forming what the French call "*Essence d'Orient*," or "Essence of Pearl," but much superior to that article, because perfectly pure. The French method,

it is said, consists in reducing the scales to powder, by which means the "essence" is composed of a mixture of the enamel and the gelatinous substance it covers, and hence its liability to putrify. Reaumur long endeavoured to discover means for preserving it from decomposition. It is now, however, preserved in ammonia. How much superior, and yet how simple, is the Chinese plan? Perhaps the enamel or nacreous covering of the scales of fish generally is capable of being employed more largely in the arts: it appears to be *sui generis*, and seems hitherto to have escaped the scrutiny of organic chemistry.

To prepare the nacreous paste for use, an adhesive property is imparted to it by the addition of a little fish glue, and an infusion of lichen. When employed, it is put in a small cup, which is placed in tepid water. Beads made of the vitreous substance employed in making artificial gade are dipped into the paste, which gives them a splendid pearly covering: strings of such beads can be had so cheaply, that the poorest children can procure them. When exposed to friction or moisture, the gemmeous matter easily rubs off, which prevents the general use of these elegant ornaments, a difficulty which Beckman, in his "History of Inventions," informs us was overcome in France at the suggestion of a lady, who proposed to the artist the introduction of the preparation into hollow beads, thus bringing the invention to perfection.

If the Chinese failed to perfect the art of making factitious pearls, they have admirably succeeded in effecting the growth of the genuine testaceous gem. Imperfect and contradictory accounts of the mode of producing pearls in mussels having at different times appeared, and as the only place of culture is within a few days' journey from Ningpo, Mr. Consul Hague and myself despatched an intelligent native to make inquiries on the spot. concerning the art, and to procure specimens in different stages of growth: the following result of these investigations, made on two successive journeys, may be relied on as authentic.

The practice of the art is confined to two coterminous villages, near the district city of Tehtsing, in the northern part of Chihkiang, in a silk producing region. In the month of May or June large quantities of the mussel (*Mytilus cygnus*) are brought in baskets from the Táhú, a lake in Kiangsú, about thirty miles distant, the largest amongst the full-grown being specially selected. As their health suffers on the journey, they are allowed a few days respite in bamboo cages in water, before being tortured for the gratification of human vanity, when they are taken out to receive the matrices. These are various in form and material, the most common being pellets, made of mud taken from the bottom of water-courses, dried, powdered with the juice of camphor-tree seeds, and formed into pills, which when dry are fit for introduction into the unfortunate subject: moulds which best exhibit the nacreous deposit are brought from Canton, and appear to be made from the shell of the pearl oyster; the irregular fragments thus procured are triturated with sand in an iron mortar, until they become smooth and globular. Another class of moulds consists of small images, generally of Buddha, in the usual sitting posture; or sometimes of fish: they are made of lead, cast very thin, by pouring on a board having the impression. Pearls having these forms have excited much surprise, since they first attracted the attention of foreigners, a few years back.

The introduction of the pearl nuclei is an operation of considerable delicacy. The shell is gently opened with a spatula of mother-of-pearl, and the free portion of the mollusc is carefully separated from one surface of the shell with an iron probe; the foreign bodies are then successively introduced at the point of a bifurcated bamboo stick, and placed in two parallel rows upon the mantle or fleshy surface of the animal: a sufficient number having been placed on one side, the operation is repeated on the other; stimulated by the irritating bodies, the suffering animal spasmodically presses against both sides of its testaceous skeleton, keeping the matrices in place. This being done the mussels are deposited one by one in canals, or streams, or pools connected therewith, five or six inches apart, at depths of from two to five feet, in lots of from five to fifty thousand.

If taken up a few days after the introduction of the mould, these will be found attached to the shell by a membranous secretion, which, at a later period, appears as if impregnated with calcareous matter; and, finally, layers of nacre are deposited around each nucleus, the process being analagous to the formation of calculary concretions in animals of a higher development. A ridge of marl generally extends from one pearly tumor to another, connecting them all together.

About six times in the course of the season several tubs of night-soil are thrown into the reservoir for the nourishment of the animals. Great care is taken to prevent goat manure falling in, as it is highly detrimental to the mussels, preventing the secretion of good nacre, or killing them, according as the quantity may be great or small.

In November the shells are carefully collected by the hand, the muscular portion removed, and the pearls detached by a sharp knife. If the basis of the pearl be of nacre, it is not removed, but the earthen and metallic matrices are cut away, melted yellow resin poured into the cavity, and the orifice artfully covered by a piece of mother-of-pearl. In this state these more than semi-orbicular pearly pellicles have much of the lustre and beauty of the solid gem, and are furnished at a rate so cheap as to be procurable by all who care to possess them; they are generally purchased by jewellers and others, who set them in tiaras, circlets, and various ornaments of female attire. Those formed on the image of Budha are finished in the same manner, and are used as ornaments and amulets on the caps of young children. A few shells are retained, with their adhering pearls, for sale to the curious or superstitious, specimens of which have, by this time, found their way into the principal public and private cabinets of Europe and America. They are generally about seven inches long, and five broad, containing a double or triple row of pearls or images; as many as twenty-five of the former and sixteen of the latter to each valve! That the animal should survive the introduction of so many irritating bodies, and in such a brief period, secrete a covering of nacre over them all, is certainly a striking physiological fact. Some naturalists, indeed, have expressed strong doubts as to its possibility, supposing the pearls were made to adhere to the shell by some composition; but the examination of living specimens in different stages of growth, having both valves studded with pearls, has fully demonstrated its truth. A tinge of yellow is found over the whole inner surface of some shells, showing that the more recent secretion of nacre by the suffering animals was unnatural; the flesh of all, however, is eaten.

Above five thousand families are represented as being engaged in this singular branch of industry in the villages of Chung kwan and Siau chang ngan; they, however, mainly derive their support from cultivating the mulberry, and in rearing silk worms. and other agricultural occupations. Those who are not expert in the management of the shells, lose ten or fifteen per cent. by deaths; others lose none in a whole season. The invention is attributed by the villagers to a native of the place, ancestor of many of them, named Yu Shun yang, to whom a temple has been erected, in which divine honours are paid to his image. He lived about the close of the fourteenth century. The topography of Chihkiang mentions a pearl sent to Conrt in 490 A.D., which resembled Buddha, being three inches in size. The resemblance was, probably, fanciful, being but an irregular form of pearl produced in the usual manner. Those now made are but half-an-inch long. and while in the shell have a bluish tint, which disappears with its removal from the matrix.

In the manufacture of factitious pearls, we find that the Chinese anticipated the French, affording an instance of independent invention; and in effect-

ing the growth of true pearls, they anticipated the discovery of Linnæus, which must be taken as another instance of the same character. It has been suggested that the great Swedish naturalist had heard of the Chinese method, or at least he was indebted to them for the *idée mere*, but there is no ground for believing that philosopher capable of such an artifice as this supposes. It will be remembered the government of his country liberally rewarded him for the discovery, and that the rank of nobility so honourably conferred upon him appears to have been prompted by the same circumstance. Coincidences of this kind have been too numerous to authorise any doubts, particularly where they asperse the reputation of the high priests of science.

In an elaborate and interesting tract on pearls and pearl-fisheries, in Chambers' Miscellany, allusion is made to a statement respecting a method of producing pearls in China, which must be taken as apocryphal. Mother-of-pearl beads are said to be strung on a thread and thrown into the live animal, so that in the course of a year spherical pearl-beads are found, resembling the real pearl. Specimens are also referred to in the cabinet of the British Museum, from which the pearls had been cut away, exhibiting a concave depression, and hence it was inferred that the nuclei had been introduced when the animals shells were younger and thinner. The internal shell is never scraped off, and, as is represented, for the insertion of a nucleus, the depressions referred to are occasioned by the process of absorption which takes place under the foreign body, while secretion is operating above. It has also been stated that specimens have been met with, in which pieces of wire had been thrust through a perforation made in the shells as the foundation of pearls. None of this description are known to pearl-dealers in this part of China. When pearl-mussels are suffered to remain several years (which is rarely done), with these foreign bodies in contact with their shells, the morbid product is formed of so many layers of nacre as to afford pearls of most beautiful character. All experiments of this description appear to have been tried in the fresh-water molluscsa; were the attempt made with oysters, particularly with the pearl procina species, it would doubtless prove yet more successful. Perhaps now that the Californian fisheries are within the sphere of their observation, some of my ingenious countrymen may be found willing to undertake the enterprise. It is very possible that the art is susceptible of improvement could it be carried so far as to render the health-destroying and perilous pursuit of diving unnecessary; however great the profit which might thereby accrue to trade or art, it would be of small consequence compared with the boon it would confer on humanity.

Ningpo, August, 1853.

GOLD CRUSHING AND WASHING.

Mr. John Phillips, in a further communication on this subject, in reply to Mr. Stansbury, says:—"Mr. Berdan, personally, is entitled to be treated with the utmost respect; and I believe that nobody denies that there is great ingenuity and merit in the machine he has invented. But that its performances have been overrated is found by referring to the published reports of Mr. Berdan's agents, wherein it is distinctly stated that the machine of four pans would 'pulverize, wash, and amalgamate about 40 tons of ore, of average hardness, in ten hours, with fifteen horse-power, being one-third more work in crushing alone than has ever been done by any other machine.' Compare this with Professor Ansted's report, in which he 'assumes' that the four basins would require an engine of twenty five horse power, and that 16 tons of average stuff might be reduced per day. I presume that by the words 'to work continuously,' he means a day of 24 hours; but admitting it to be only 10 hours, we have here the 40 tons brought down to 16, while the moving force is 25 instead of 15. This will suffice to prove my point, that the power of the machine has been overrated; and I have only to add, that it is far from my wish to say anything that may be offensive to Mr. Stansbury, whose interesting paper I read with much gratification; but the subject is one open to discussion and comment."

Home Correspondence.

FLAX, AND ITS PRODUCTS, IN IRELAND.

CONTRIBUTED BY WM. CHARLEY, SEYMOUR HILL, BELFAST.

Letter V.

After making room in my last communication for Mr. Lee's rather long defence of his patent, I had not space enough for Mr. Williamson's letter on the subject, or the memorial of the merchants already alluded to. I now beg to transcribe these documents which, in my opinion, point out the defects and errors of Mr. Lee's patent so very plainly and decidedly that very little can be added by me.

Letter from Mr. R. Williamson, of Lambey House, to the Secretary of the Linen Board, Dublin, upon the subject of Mr. Lee's Machinery.

January 13, 1816.

"Since I did myself the favour of addressing you last, a meeting of the trade has been called at Banbridge, to re-consider the business of Mr. Lee's patent preparation of flax. This meeting was assembled at the instance of the patentee, and for the purpose of confuting, personally, the arguments, and disproving the experiments, that had been adduced against his project: and as my letter formed the principal topic of discussion by Mr. Lee, it is incumbent on me to defend it. He there asserted, as I am informed, that my experiments were incorrect, and my deductions, of course, unfounded. He endeavoured to prove this by producing, from his machines, a few ounces more of flax in the same time, than was mentioned with the samples sent to the Board. I must beg leave to call to your recollection, that the sample sent with my letter, was from *green flax*, the state in which it is generally, and necessarily pulled here; and that Mr. Lee's experiment was from flax in a more mature state, and, as we conceive, unfit for our finer fabrics; for, in proportion as the flax is ripened, the received opinion with us is, that the fibre becomes harsh. The experiment stated by me was performed in my immediate neighbourhood by Mr. W. J. Handcock, and his accuracy, with some allowance for a trifling diminution of quantity, by the inexperience or inexpertness of the operator, was unquestioned. On the ground of the additional quantity then produced, the patentee wished for a certificate from the persons present, which was refused, on the score of a new trial having been agreed to be gone into, and the result is to be reported at a future call of the trade. The meeting was attended by the Marquis of Downshire, and the thanks of the trade are due to his Lordship for his zealous and undeviating regard to its interest, and the patience he evinces in the investigation of any measure proposed for its advantage. This sort of patriotism is an heir-loom in his Lordship's family; it belongs to his great possessions, and I trust will go down to his posterity. It is a bequest of that first Marquis, whose memory will still be venerated by the linen trade. The consideration of Mr. Lee's patent in being referred to the trade, stands now as was at first suggested, though I am satisfied there can be but one rational opinion as to the success of the project. It is now the middle of January, and not a single piece of linen has, I believe, yet been manufactured from Irish flax prepared by the patent machines. I shall, however, give Mr. Lee all the advantages of his experiments in this impeachment of one portion of my letter, and admit that a man may, under his direction, and with his assistance, clean 10 lbs. of *ripe* flax in a day (a thing not practicable with green flax). What proportion does that bear to the quantity produced by our mills, in which one man can clean a great deal more even of Mr. Lee's flax, and from five to six stone in the same time of our own, prepared in our own way, without the intervention of His Majesty's Royal Letters Patent. That the enhanced value of steeped flax is in an increased ratio to the quantity, I shall presently take the liberty of stating. Mr. Lee has taxed me with the temerity of a premature report. The truth is, that I wished to do away, as soon as possible, the mischief of an error which some of us had been led into, by a dazzling but illusory experiment. I own, with extreme regret,

that my first letter was premature, and I used the earliest means of preventing the injury which might have resulted to the flax-growers and manufacturers of the North of Ireland, where this letter unluckily had circulation. Your recollection of the early history of this sealed patent need not now be recalled. Its want of the usual specification, lest the discovery might be transmitted to foreign nations before we had the advantage of it, you can well remember. I need not particularise the clauses of that *private Act of Parliament*, by which the mystery was concealed, though the patent was in exercise. These things are on your minutes, and the inutility of the precaution will be discovered by a reference to the accredited report of Mr. Durno, British Consul at Memel, on the cultivation of flax in Russia, Prussia, and Poland. This gentleman informs us that the plan of preparing flax without steeping had been practised, and afterwards exploded, in that country, as being more laborious, more expensive, and also attended with more breakage of the harle, or fibre; and that there is less reason to doubt of the steeping process being best, as it is almost universally adopted in that part of Poland where these articles are most extensively and best cultivated. To this account I beg leave to add a communication from Rotterdam, in September last, from M. V. Wallen, a very respectable and intelligent gentleman, to a friend of mine here; I give it in his own words:—'As to what you wrote me of the manner of breaking flax by machines, without water-rotting or dew-rotting, I presume you will soon repent of that invention; we have tried it long since, but the linen made from it was of no lasting or strength.' This latter gentleman then describes another invention of a M. Bralle, of Amiens, of as little utility. I do not mean to infer that Mr. Lee was aware of the previous trial and condemnation of his alleged discovery, where he thus guarded himself against continental pillage. I have too much respect for his candour—too much regard for his veracity and common sense—to suppose that he had informed himself of these facts. As to the *novelty* of the patent machines, that may be fully conceded to him, without risk of invasion. If this gentleman, however, without pursuing in the mystery of concealment things in their own nature generally impracticable, if not impossible—if he had not been inspired with the dreams of an immense remuneration—if he had entered into a liberal communication with persons of equal, or superior ingenuity and knowledge with his own—these errors could not have been got into; and his plan, it is to be doubted, has as little to do with *science*, as it has with *experience*.

"I have already mentioned to you the fatal and incurable defects of the patent flax, in the shortness of the *draft* in spinning, from its being cut traversely, in the difficulty of joining, and the consequent brittleness of the yarn in weaving. These bad qualities are further corroborated, and can be best ascertained by the examination of our most intelligent and respectable manufacturers. The trials made by them have been on flax imported from Mr. Lee. They attest, that neither the white nor the yellow flax can be joined with facility or strength. They find (to use their own technical terms) that the warp o the white yarn loses the *dressing*, and that both it and the yellow brush into lumps at the joinings during that operation; that the yarn breaks in the *reed-walk* and between the *beam* and the *gears*, losing, at the same time, its twist, so that when thus broken it cannot be effectually tied; and, from not bearing the stroke of the *sleas*, that no thickness of fabric can be attained. This weakness is equally felt in the weft, which gives way in the straining of the *temples*, occasioning frequent breaches in the selvage. Such is the decided opinion of those who have tried the patent flax. The evil seems inherent in the preparation. It appears, therefore, that without the fermentative process of steeping and grassing, all *mechanical* means of separating the fibre have been unsuccessful. The objection is fatal alike to the quantity and the quality. In short, this project seems to have failed in its claim to originality of discovery, in its means of attainment, and in its principle and end. When such are the obvious defects in the system, any observations as to bleaching will be unnecessary. The facility in this point has been greatly overrated. If the oil is previously removed, the linen, when put to bleach in the usual way, must be injured on the grass before the *sprit* can be discharged. To effect this it must receive a double dose of oxy-muriatic acid; but, indeed, the whole scheme is so illusory, that I should offend your common sense by further practical illustration. The flax produced from the steeping process has been so far, without one dissentient voice, placed beyond all comparison above that prepared by Mr. Lee. It does not belong to me to go into scientific reasons for this preference—it is enough to feel from our prosperity that we are right. It is observed by Fourcroy and his late editors, that the phenomena of vegetable fermentation is not yet sufficiently studied or understood. When this reproach is cast on the chemist, it would be unreasonable to visit it on the flax-grower or manufacturer. All we know is that humidity, or the presence of water, is necessary to produce this vegetable fermentation—that the putrid fermentation in steeping does not extend to the wood or fibre of flax—it reaches only the gluten or mucilage which attaches the fibre to the wood, rendering them easily separable, and thus, by a simple process of nature, attenuating the fluid which pervades the fibre itself. The fibre in this process becomes softened and ameliorated, and fitted for that beautiful linen in which Ireland so peculiarly excels. A certain portion of oily matter is esteemed requisite to protect the yarn from friction in the loom, and in proportion as yarn is divested of its oil we deprive it of its tenacity. It is unnecessary to add that the peculiar fitness of our climate and country, with its humidity, and springs, and waterfalls, bleaches and finishes what the spinners and manufacturers have so well begun.

"Now, what does this new plan attempt to accomplish? It presumes to disregard the deductions of science, and to set at nought our practice and our proficiency. The machine is to be the substitute for the flax mill, and exploded as this scheme has been by our cotemporaries on the continent, its propounder ventures to say, for your skill and your success you shall have my patent. And what is this basket of brittle ware in due time to produce to the possessor? 'One hundred thousand pounds, and thirty thousand a-year during the period of the patent.' But we are to pause before we reject this donation of his patent. We are told by him, 'If you do not accept my offer, your trade will go to England; the new flax is peculiarly fitted for mill-spinning, and machinery is already waiting to give you yarn of 20 or 30 hanks in the pound.' If Mr. Lee's plan of mill-spinning were indeed practicable, our trade would go to England; the flax would follow the machines—the machines would follow the power—and the skill and the capital, and all would be engulphed in the coal pit! The misery that would ensue to an impoverished peasantry, injured as they would be in morals, and habits, and health, I shall not state, because I believe the whole to be an idle illusion, the marvel of a day, not to be heard of hereafter. As a member of the trade, I have now performed what I conceive to be my conscientious duty, in thus, most respectfully, submitting my sentiments to the Linen Board, and I beg you will have the goodness to lay this letter before it."

This Mr. Williamson was one of the most intelligent linen merchants of his day; (a) he appears to have had a great dread of the factory spinning system, and though the results have not been so injurious to public principles and health as he anticipated, yet it must be admitted the moral argument in favour of hand spinning *at home* in the parents' cottage is almost irresistible. The laws of progress, however, must be obeyed in commercial communities on pain of losing their trade or manufacture. Belgium and the other continental nations neglected the new system of mill-spinning, and, in consequence, a large proportion of their linen trade was transferred to Ireland, never, in all probability, to return. After putting one's hand to the plough there must be no looking back—no hankering after days gone by, but a firm resolve to keep in advance and to make the best of every difficulty that may arise. It is this feeling and this principle that has so successfully guided the linen merchants and manufacturers

(a) Mr. John Williamson, his father, was also a man of importance. In 1762 the Magistrates became more vigilant in carrying out the laws at the Brown Linen markets. The consequence was great clamour and excitement among the masters, who, at Lisburn, issued the following curious proclamation (See "Newry Mag.," Vol II.):—"This is to give notice, to all gentlemen, manufacturers, and weavers, to meet in a body like valiant and honest men, at Lisburn, on Tuesday next, that we may oppose the unprecedented and oppressive means which are to be used against us by the merchants, and to bring them to reason by fair means; and if that will not do, other means must be used; and let us, like Demetrius and his craftsmen, stand valiantly up for our Diana, for our craft is in danger." The comparison is perhaps more truthful than happy. The same authority states that the mob assaulted Mr. Williamson, who narrowly escaped serious injury, which was the more scandalous from the high character he bore for probity and generosity.

of the North of Ireland. The following is their opinion of Mr. Lee's patent.

"*Memorial from the Linen Merchants of Belfast and Lisburn upon the subject of Mr. Lee's Machinery.*

"*To the Right Hon. the Trustees of the Linen and Hempen Manufactures.*

"February 27th, 1816.

"We beg leave most respectfully to address you concerning sundry Letters Patent granted to Mr. James Lee, of Middlesex, as far as they relate to the linen manufacture of Ireland. It appears upon reference to your Minutes, that Letters Patent, touching the interest of our staple manufacture, have been hitherto graciously referred by his Majesty to the Lord-Lieutenant of Ireland, and thence to the Linen Board; and your Minute of the 2nd of December, 1788, records your declaration, that there is no statute in this kingdom authorising the grant of such patents.

"We therefore pray, that as the late grant to Mr. J. Lee may form an injurious precedent, and still more so from its want of an open specification, you will take measures to do away and prevent the recurrence of such unauthorised precedents, contrary to your said Resolution.

"We beg leave to inform you that the patent machines of Mr. James Lee have been found of no use in our manufacture, and that the plan has not originated with the patentee. We, therefore, pray, that your premiums may be restored to their accustomed channel.

"We respectfully suggest that the projects of persons unconnected with our concerns, and who are generally wanting in practical knowledge, ought to be received with extreme caution, from the injury the trade has suffered from such projects and the waste of public money.

"Resting upon the high reputation to which our great staple has attained, by its own means, at home and abroad, we entreat your attention to this our representation.

"We are, my Lords and Gentlemen, &c., &c.

"Signed by 34 gentlemen in the Trade, and resident near Belfast."

If anything were wanting in Mr. Williamson's letter, this brief protest of the practical men in the trade would be enough to decide the merits of the case, but the two documents jointly form an authority not to be questioned. Mr. Lee admits he was treated with great consideration and kindness, and therefore the failure of his propositions cannot be ascribed to any unwillingness to improve, but entirely to their own inherent defects. As this patent caused great commotion in its day, and as thousands of pounds were spent in testing its utility, the full account I have given will I am sure be acceptable to those who take an interest in such subjects. In my next paper I purpose treating of the recent patents for the improvement of flax manufacture.

[N.B.—Errata in printing last letter (Letter IV.):—Page 28, col. 1, line 12, for *greatly*, read *eventually*; line 25, for *automatic*, read *unromantic*; and for *crusted*, read *trusted*; line 40, for *obserably*, read *absurdly*.]

A CHAPTER OF INVENTION.

RUTHVEN'S PROPELLER.

SIR,—Some score years back the child of Watts' brain, the steamboat, had its material birth in Scotland, whence it spread far and wide on both sides of the Atlantic. The "saw-mill on one side and grist-mill on the other" of the Mississippi boatman—the paddle-wheels—have since been much damaged by the screw; but both screw and paddles are now, if reports be correct, likely to be set aside by a newer invention, save in the case of Mr. Brunel's proposed vessel, in which, it is said, both screw and paddles are to be used together, and wedded to fame.

More than a dozen years ago a certain John Ruthven, descendant, it is said, of the stern old Rizzio-killer followed the more honourable vocation of printer, changing subsequently to that of press-maker, in the city of Auld Reekie, in which he acquired fame. He had sundry sons, and two of them (one named Morris West Ruthven) were brought up under their father as engineers, and Morris subsequently became an engineering manager in Rotherham. The idea came somehow into John Ruthven's head, when turned of fifty, that steamboats were not perfect, which, doubtless, was a presumption "in a printer bodie with a wheen auld farrant notions." But he could not be easy or rest till he had obtained a patent monopoly of fourteen years for his invention, to carry which into effect he recalled his son Morris from Rotherham to engineer a boat to put in practice his sire's ideas, in which a brain of a mathematical turn much helped him.

The idea was, by means of a water fan to pump water through the fore part of the bottom of a vessel, and discharge it at the side farther aft. The water fan was, in fact, neither more nor less than what is known far and wide as Appold's pump. This may be understood generally, without going into the more detailed question of the curves of the blades. Through good report and ill report, John Ruthven stuck to his text—that his propeller was the true one, and, to back his opinion, began to construct a boat.

If we examine the action of any common pump we find that a certain power on the handle is required to lift the column of water. If the pump were placed on springs, just balancing its weight, it would be found that, instead of drawing the same amount of water up, the pump would be partly drawn down by the operation of the sucker. Place the pump horizontally in a vessel floating on water without the springs, and the result would be that the vessel would be drawn forwards, while water was drawn into the vessel, unless the vessel was disproportionately heavy for the size of the pump. A pair of pumps, working alternately, would keep up constant motion, greater in proportion to the speed of the pumps. But there would be the great disadvantage of the reciprocating action causing jerks, concussion, loss of power, and consequently diminution of speed.

All this, doubtless, passed through the mind of John Ruthven, inducing him to make his pump with a continuous circular movement,—in short, a water fan always revolving in one direction.

Much he strove to acquire friends to help him; but there is no rest, no hope for the non-practical schemer, save in his own strength. An open boat, about thirty feet long, and five feet wide, was finally built, with an engine and vertical boiler. She came to the Thames, and was christened by the not euphonious name of the "Squirt," from her water-projecting faculty. It appears that she was tried, and faintly praised by some of the government authorities. Funds probably were low with the inventor, and the boat laid long on the river bank, an object of curiosity to many, but not kept in constant work, as might have been done by a more prosperous owner. He tried to find a patron among the London engineers unavailingly. He went with his son to the United States, and tried all the shipbuilders, but also unavailingly. He returned to Scotland, but not to despair—that is the last thing in the blood of a true inventor.

The man was clearly a schemer—a favourite term of reproach by practical men, "who never make a mistake," because they never do anything but what has been done before—in reality, passing their time in one continuous mistake, for which the unthinking call them "safe men." Such men so hate schemers, that they would shake their heads if any one were to allude to the "great scheme of Creation," and consider it was rebelling against Providence.

Columbus was fifty-three, when by grace of the true womanly Isabella, he sailed on his first voyage. John Ruthven had turned sixty, when one day he for-gathered with one John Anderson, the greatest fish merchant of Edinburgh, who liked not to sell "caller haddies," and call them "lives o' men." Keen-witted as any Christie Johnstone, he saw that fishing in an open boat caused risk and uncertainty, and that men's lives would continue to be lost, and customers to be disappointed, and the finest

fish be missed, unless some means could be contrived to reach, and return quickly, from the deep sea. "Yon steamers might do, but the fashous paidles wad just frichten a' the fish, and the screw thing was nae better, baith screw an' paidles wad just hitch i' the nets, and tear them a' i' pieces." In the very nick of time, John Ruthven showed his scheme, and John Anderson clutched it. His plain practical sense told him it was right, and he determined to set going, if possible, a company for deep-sea fishing.

The company was organized, and Lord John Scott, a descendant of the "Bauld Buccleugh," did a better deed for humanity than ever his ancestor did in a border raid, in becoming its chairman. But all was not yet achieved. There were cautious men amongst the directors, who liked not to meddle with the untried. "Why not have a common steamer, that all the world understood?" "And frighten all the fish!" exclaimed the irate fish-merchant. At length the disputants agreed to refer the matter to an engineer. Daniel Kinnear Clark was chosen. He gave in a report that the plan was consistent with sound principles, and that if properly constructed the vessel would be successful.

So it was finally settled—an iron vessel of one hundred feet in length, and fifteen feet beam, was laid down at Granton, to the lines furnished by Morris West Ruthven, with bottom plates 5-16th of an inch, sides 1-4th of an inch, top sides 3-16th of an inch. An iron tube forming the vessel's kelson had a fan fixed in it, the water entering through holes in the bottom, passing through the fan, and escaping at either side behind the fan.

Mr. D. K. Clark states that at the first trial, the vessel made six knots from Granton-pier down the Forth. The second trial is thus stated to have taken place on Tuesday last:

"The maximum speed attained was about twelve miles an hour, and going at full speed *she stopped within fifty feet*. She appeared standing stock-still all the time we were *running*, and those on board declared they could not be aware of her moving without looking over her side."

If this report be correct, it is remarkable as a first essay, and may warrant more at a future time, when experience shall have corrected defects. It is probable that great speed will ultimately be obtained by this propeller, and there is a convenient power of multiplying the numbers; and by means of these vertical shafts in distinction to the horizontal shafts of the paddles and screw propellers, there need be no inconvenient interference with the steerage of the vessel. Moreover, the engine might be placed on deck, if preferred, or in any other position. The vertical shafts give great facilities for this.

In planning a large steamer some years back, the desirability of vertical shafts for convenient stowage of the engine occurred to me, and I had a model made with submerged paddles beneath the bottom. But the inefficiency, and the inconvenient exposure to accident, caus me to lay it aside. Subsequently, the idea occurred of a succession of lateral or bottom fins or scales, to be slowly opened and then rapidly closed against the vessel's side and bottom, so as to eject the water astern. Supposing no difficulty in the detail, and the whole length of the vessel to be so provided, it is probable that the speed gained would be considerable.

But with Ruthven's propeller the objects aimed at seem to be accomplished; the machinery is out of the way, and when not at work, the external hull is free from all obstructions to sailing, without any manipulation whatever, and with a facility of multiplying at pleasure. There is every probability that this new plan will work a revolution in steam navigation, and facilitate the structure of much larger vessels than have yet been proposed. There is but one apparent disadvantage, the sucking in matter, to stop the entrance orifices of the pumps, as in the process of "thrumming a sail" to stop a leak. But, probably, the reverse action would suffice to clear them.

I am, Sir, yours faithfully,

COSMOS.

Dec. 11, 1853.

SUGAR OF LEAD REFUSE.

Sir,—Having reason to believe, from what passed in conversation with a Chemist and a Fellow of the Royal Society, that the manufacturers of sugar of lead are not aware of the nature of a greyish powder produced by the solution of that metal in vinegar, and that, thinking it of no value, they allow it to be thrown away, I beg to mention that it consists almost entirely of silver, in a state of very minute division.

Mineralogists have long been aware that most ores of lead contain a greater or less per centage of silver, and hence it was natural to conclude that the lead procured from them should also contain silver. But it was reserved for an eminent manufacturing chemist, who was remarkable for turning chemical refuse to useful purposes, to examine this powder and collect it in such quantities as in the course of years to supply himself with many valuable articles of plate.

Your obedient servant,

W. C.

December 14, 1853.

SAFETY LAMPS.

Sir,—In the report of my observations on the Safety Lamps, made at the meeting of the Society of Arts, on Wednesday evening last, and published in the Journal of Friday, December 9th, there are some mis-statements which I should feel greatly obliged to have corrected.

It is stated the light is reflected through *glass*. There is no glass about the lamp, but the reflector is of German silver, which should be, horizontally, of a parabolic form, the light being placed in the focus of the parabola. Behind the reflector, and between it and the outer case of the lamp, is a cavity, which I suggest may be partly filled with water, which would delay the overheating of the lamp, if inadvertently left burning in an explosive atmosphere. The funnel spoken of, is the chimney, up which the heated air escapes through a perforated metal plate at the top. The air is *admitted* through the wire gauze in front.

When the lamp is placed in an explosive atmosphere, the gas burns against the inside of the wire gauze, which prevents a further supply of oxygen reaching the wick of the lamp, and it is therefore extinguished; but the gas would continue inflamed within the gauze so long as the lamp remained in an explosive atmosphere. It should, therefore, be immediately removed, or the flame be extinguished by covering the wire gauze with the hand, or by other means. The pricker, with which I mentioned the lamp exhibited by me was not provided, is the contrivance for trimming the wick, which could be attached with equal facility as to the common Davy lamp. It has no connection with the lock. The lamp is locked by means of a screw in the top part, by which the top can be fastened to the base of the lamp when in its place, so that it cannot be taken off without the aid of a key.

I am, Sir, your obedient servant,

BEN. BIRAM.

Wentworth Woodhouse, Dec. 12, 1853.

PATENT ROYALTIES.

Sir,—At the same time that you furnish your readers with the amount of patent royalties paid by the metal trades, it would be very desirable also to specify, as much in detail as possible, the amount of profits, and the particular classes of purchasers. This knowledge would very much facilitate general trade.

Z.

Proceedings of Institutions.

Basingstoke.—On Thursday and Friday evenings the members of the Mechanics' Institute were gratified by the delivery of two Lectures, at the Town Hall, by Mrs. Balfour. The subjects selected were "The Uses of Poetry, and the Mission of the Poet," and on "The Memorable Youthful Poets of the Present Century." The Honorary Secretary announced that he had received a donation of *5l.* to the funds of the Institution, from G. Sclater, Esq.

Corfe Castle.—The Right Honourable George Bankes, M. P., President of the Mutual Improvement Society, recently delivered his long-promised Lecture to the members and friends of this Institution. The subject was "The Influence of Oratory on the minds and actions of men, as it appears in various periods of history." After alluding to the most eloquent Grecian and Roman orators, the right hon. lecturer spoke of Wolsey, Bacon, Pope, Camden, Bolingbroke, Walpole, Pitt, and Fox, concluding with Wilberforce, and illustrating his remarks by numerous quotations. At the conclusion of the Lecture, the Rev. George Hubbard proposed a vote of thanks to the lecturer, which was carried by acclamation.—A handsome present of books has been received from John Cooke, Esq., of Newport, Isle of Wight, who had previously delivered a Lecture to the members "On the progress of Literature from the earliest period up to the reign of Queen Elizabeth."

Maidenhead.—An agreeable *reunion* of the members and friends of the Literary and Scientific Institution, was held on Tuesday se'nnight; and advantage was taken of the occasion to present Mr. C. Brown, retiring honorary secretary, with a testimonial, consisting of a handsome silver tea service. Mr. Brown, in acknowledging the presentation of the testimonial, congratulated the institution on its prosperity. It now numbered more members than it had ever done, and the greatest increase had been during the past year. This was a subject of much pleasure to him, for he felt that it could not be said that he was deserting a sinking cause. On Thursday evening, the eighth annual meeting was held in the Guildhall, the Rev. Charles Vansittart presiding. Eight new directors were appointed. Mr. Durant was elected to the vacant secretaryship, and Mr. J. Smith re-elected treasurer.

Tiverton.—The re-opening of the Athenæum, which was partially destroyed by fire in February last, took place on the 18th November, and was celebrated by a literary and musical soirée, under the presidency of J. Heathcoat Amory, Esq. A large party attended, comprising most of the gentry of the town and neighbourhood. The premises have undergone considerable improvement. They contain a large and handsome lecture-room, reading-room, news-room, class-rooms, library, &c., and are in every respect adapted for the purposes of a literary institution. On Thursday, December 1st, the Rev. W. Beal, of Devonport, delivered the opening lecture of the session, on the "Development of the Religious Element in Man." The lecture embraced interesting and comprehensive sketches of sun, fire, element, and symbol worship, mythology, &c., and was well received by a numerous and respectable audience. It is gratifying to report the prosperity of this institution.

Wrexham.—During the present quarter, a series of interesting lectures have been delivered at the Literary Institute, on the following subjects:—"On California and Australia," by Mr. W. Hughes, F.R.G.S.; "On the Memory," by Mr. H. Dicker (gratuitous); "On our Indian Empire," by Mr. R. C. Rawlins (gratuitous); and, lastly, readings of "Hamlet" and the "Merchant of Venice," by Mr. H. Nichols. The engagement of paid professional lecturers is an experiment intended to be continued during the ensuing quarter, for the carrying out of which the Committee are indebted to the generous aid afforded them by two gentlemen of the neighbourhood—Mr. R. Thompson, of Stansty Hall, and Mr. J. Lewes.

To Correspondents.

The third and concluding part of Mr. Loseby's Paper "On Chronometers," will appear next week.

MEETINGS FOR THE ENSUING WEEK.

Mon.	Society of Arts, 7.—Renewed Discussion "On the Consumption of Smoke."
	London Inst., 7.—Mr. J. Phillips, "On the Philosophy of Geology."
	Chemical, 8.
	Statistical, 8.—Dr. Guy, "On the Duration of Life of the Members of the Medical Profession;" and Dr. Thomson, "On the Stature, Weight, &c. of New Zealanders."
Tues.	Civil Engineers, 8.—Annual General Meeting.
	Linnæan, 8.
	Pathological, 8.
Wed.	London Inst., 7.—Conversazione.
	Society of Arts, 8.—Mr. Horace Green, "On Pettitt's Fisheries Guano."
	Microscopical, 8.
Thurs.	Numismatic, 7.
	Antiquaries, 8.
	Royal, 8½.
Fri.	Architectural Assoc., 8.—Class of Design.
Sat.	London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany."

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

From Gazette, 9th December, 1853.

Dated 19th October, 1853.

2407. P. A. le Compte de Fontainemoreau, 4 South street, Finsbury—Composition inlieu of bone and horn. (A communication.)

Dated 24th October, 1853.

2454. C. F. Blunt, 19 Montague place, Russell square—Blunt's Diamond Coal Fuel.

Dated 17th November, 1853.

2668. C. Burton, 487 New Oxford street—Improvements in carriages.

Dated 23rd November, 1853.

2720. H. R. Abraham, 11 Howard street, Strand—Coffins and hearses.
2721. C. F. Stansbury, 17 Cornhill—Apparatus for drill sowing guano, &c. (A communication.)
2722. J. F. Empson—Manufacture of wire.
2723. J. Hill, senior, and J. Hill, junior—Winding, doubling, and spinning machinery.
2724. J. Amos, Bristol—Wood for casks.
2725. J. Timewell, Duke street, St. James's—Cutting and shaping materials for dress.
2726. J. Dicks, Parliament street, Nottingham—Bands for binding packets of lace, &c.
2727. E. Wilkins, 60 Queen's row, Walworth—Draining land.
2721. W. B. Johnson, Manchester—Steam engines.
2729. J. D. Brady, Cambridge terrace—Straps for knapsacks.
2730. T. W. Kinder—Permanent way.

Dated 24th November, 1853.

2731. J. Lovell, Glasgow—Application of heat.
2734. D. Chalmers, Manchester—Railway breaks and signals.
2733. H. Mason, Ashton-under-Lyne, and J. Jones, Manchester—Doubling, twisting, and spooling machinery.
2734. S. Holman, Colney Hatch—Double action pump.
2735. A. V. Newton, 66 Chancery lane—Chest expander, &c.—(A communication.)
2736. G. M. Richards, Swansea—Feed plates used for oxidising lead, and refining silver and lead.
2737. S. C. Lister Manningham, Bradford—Combing wool, &c.
2728. G. Townsend, Massachusetts—Sewing machinery (A communication.)
2739. W. Jones, Kilney cottage, Swansea—Bricks.
2740. D. L. Banks, 42 St. James's place, Toxteth park, Liverpool, Rotatory engines.

Dated 25th November, 1853.

2742. D. Nicholl, Edinburgh—Envelope manufacture.
2743. J. Berry, Manchester—Machinery for wire fencing.
2744. W. Calder, Glasgow—Treatment of thread and yarns.
2745. W. L. and C. Brook, Meltham mills, near Huddersfield—Preparing, dressing, &c., cotton, &c., and machinery for same.
2746. A. Drew, Glasgow—Ornamenting woven fabrics, &c.
2747. J. H. Johnson, 47 Lincoln's inn fields—Carding engines, &c. (A communication.)
2748. J. H. Johnson, 47 Lincoln's inn fields—Production of printing surfaces. (A communication.)
2750. A. E. L. Bellford, 16 Castle street, Holborn—Improvements in pens and pencils. (A communication.)
2751. A. E. L. Bellford, 16 Castle street, Holborn—Rotary engines. (A communication.)

2752. C. C. S. Grenier, Paris, and 16, Castle street, Holborn—Paint for buildings, &c.
2753. E. Wilkinson and W. Rye, Oldham—Power-looms
2755. E. Barthelemy and T. Petitgeau, Upper John street, Fitzroy square, and J. P. Bourquin, Newman street, Oxford street —Ornamenting glass.

Dated 16th November, 1853.

2756. W. C. Moat, Strand—Truss.
2758. G. E. Gazagnaire, Marseilles, and 16 Castle street, Holborn—Nets for fishing, &c.
2760. J. Roth and H. Danner, Mulhouse, France, and 16 Castle street, Holborn—Cards for carding.
2762. L. Cornides, 4 Trafalgar square—Gelatine with other substances, and colouring same, to resist atmospheric influences.
2764. J. S. Rousselot, Nimes, France—Magneto-electricity for machinery, &c.

Dated 28th November, 1853.

2766. W. Pritchard, Clerkenwell—Buffers, and diminishing shock in collisions.
2768. P. C. J. B. Sochet, Paris, and 4 South street, Finsbury—Motive power by heated gases.
2774. S. Hurrell, New North street, London—Machinery for measuring, winding, or rolling fabrics.

Dated 29th November, 1853.

2778 A. E. L. Bellford, 16 Castle street, Holborn—Firearms. (A communication.)
2780. J. A. Manning, Inner Temple—Treatment of sewerage and products thereof.

APPLICATIONS FOR PATENTS, WITH COMPLETE SPECIFICATIONS FILED.

2819. C. W. Hockaday, Post hall, Brighton—Chemical compound as a remedy for scorbutic affections. Dec. 5, 1853.
2830. J. Mold, 6 Portland terrace—Improvements or additions to augment convenience by transformation and facility the different lines required in the erection or manufacturing edifices or structures by apparatus, tools, or instruments suitable for the different capacities of operation and general surveying. Dec. 6, 1853.

WEEKLY LIST OF PATENTS SEALED.

Sealed December 8th, 1853.

1402. Frederick Ludewig Hahn Danchell, of Elm grove villas, Acton green, and William Startin, of Heathfield terrace, Turnham green—Improved mode of obtaining auriferous deposits from the beds of rivers and lakes, and from pits containing water.

Sealed December 9th, 1853.

1408. Antoine Pongou, of Marseilles—Certain improvements in obtaining motive power.
1410. William Muir, of Manchester—Improvements in turning-lathes; a part of which improvements is applicable to other useful purposes.
1414. William Brookes, of Chancery lane—Improvements in treating fabrics suitable for floor-cloths, covers, and such like articles. (A communication.)
1415. William Brookes, of Chancery lane—Improvements in the manufacture of boxes and other hollow receptacles. (A communication.)
1425. Christopher Binks, of Albert villa, North Woolwich—Improvements in dryers, and in preparing drying oils for oil paints, varnishes, and other uses.
1435. Richard Hopkins, of Manchester—Improvements in machinery or apparatus for cutting and shaping cork wood and other similar substances
1501. Robert Midgley, of Northowram, Yorkshire—Improvements in preparing and finishing certain worsted yarns, and in apparatus employed therein.
1503. William Boggett, of St. Martin's lane, and George Brooks Petit, of Lisle street—Improvements in dioptric reflectors.
1911. Richard Archibald Brooman, of Fleet street—Method of, and machinery for, reducing wood and other vegetable fibres to pulp, applicable to the manufacture of paper, pasteboard, millboard, papier maché, mouldings, and other like purposes. (A communication.)

Sealed December 12th, 1853.

1428. William Smith, of Sheffield—Improvements in the mode of manufacturing metallic handles for knives and forks, backs for razors, bows for scissors, and the relative parts of such like instruments.
1429. John Marsh, Theophilus Marsh, James Marsh, and Walter Marsh, all of Sheffield—Improved mode of fastening the handles of table knives and forks.
1457. Timoléon Zoé Louis Maurel, of Paris—Certain improvements in horological alarms.
1467. Peter Armande le Comte de Fontaine Moreau, of South street, Finsbury—Improved process for preserving milk, and its application to several organic products and alimentary substances. (A communication.)
1468. Peter Armand le Comte de Fontaine Moreau, of South street, Finsbury—Improvements in the preparation of certain vegetable and alimentary substances. (A communication.)
1489. James Heginbottom and Joseph Heginbottom, of Ovenden, Yorkshire—Improvements in spinning.
1502. Hiram Barker and Francis Holt, both of Manchester—Improvements in machinery and apparatus for grinding and turning metals.
1552. Robert Harlow, of Stockport—Improvements in constructing and working valves for baths, washstands, and other purposes.
1801. John Griffiths, of Stepaside Saunderfoot, near Tenby—Certain improvements in steam engines.
1836. William Newton, of Chancery lane—Improvements in the process of coating cast-iron with other metals and the alloys of other metals. (A communication.)
1851. Thomas Young Hall, of Newcastle-upon-Tyne—Improvements in safety-lamps; part or parts of such improvements being applicable to the consumption or prevention of smoke, and for the purposes of ventilation generally.
1936. William Curtain, of Retreat place, Homerton—Improved machinery for printing textile fabrics, oil cloths, leather, paper hangings, and other similar fabrics or materials.
1975. Charles Collyford Banks, of Clapham—Improvements in lubricators.
1993. Samuel Taylor, of Manchester—Improvements in apparatus for generating and applying carbonic acid gas.
2234. Hiram Berdan, of New York—Machine for collecting, preserving, and thereby preventing the loss of mercury, in the process of amalgamating metals, and for the more perfect and economical washing, separating, and amalgamating of auriferous and other ores.
2254. John Wincoll Baxter, of Mistley, Essex—Certain improvements in ship building.
2258. William Henry Wilding, of Chesterfield street—Improvements in propelling machinery.
2262. William Peace, of Haigh—Hewing and excavating coal, cannel, and other minerals, strata, and substances, by certain machinery and appliances thereto.
2322. James Knowles, of Eagley Bank, near Bolton le Moors—Improvements in machinery for regulating the velocity of steam engines and other motive power engines.
2341. Patrick Clark and Alexander Clark, both of Gate street, Lincoln's inn fields—Improvements in revolving shutters and other closures for portable and other buildings.
2348. Charles Scott Jackson, of Cannon street, City—Improvements in preserving seeds, potatoes, and other roots.
2362. Thomas Grahame, of Hatton Hall, Wellingborough—Improvements in building ships and other vessels.
2393. Ellen Jones, of Palace street, Pimlico—Improvement in steam engine governors. (This is the same invention as that for which letters patent were granted to her late husband on the 14th day of April last.)
2426. Julius Augustus Roth, of Philadelphia—Improvements in the bleaching and drying of fibres or fibrous materials; part of which improvements is applicable to the drying of woven and other textile manufactures.
2447. John Henry Johnson, of Lincoln's inn fields—Improvements in mills for grinding. (A communication.)
2450. James Denoon Young, of Westminster—Improvements in casting.

Sealed December 14th, 1853.

1437. William G. Craig, of Newport, Monmouth—Improvements in axle boxes, guides, and bearings of locomotive engines and carriages; parts of which improvements are applicable to the bushes and bearings of machinery.
1450. John Mackintosh, of Pall Mall East—Improvements in the construction of portable boats, or vessels, or buoys.
1659. William Francis Snowden, of Weymouth—Improved mangle.
2001. Edward Patrick Gibbon, of Dublin—Improvements in window frames and sashes.
2133. Charles Townsend Hook, of Tovil House, Maidstone—Improvements in the manufacture of pulp.
2352. Henry Whitaker Butterworth, of Philadelphia — Improved supplemental reflux valve for steam engines. (A communication.)
2417. Thomas Thompson, of Much Park street, Coventry—Improvements in machinery for weaving carpets, coach lace, and velvet.
2421. William Russell, of Birmingham—Improvement or improvements in the manufacture of copper tubes.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Dec. 7	3538	A Solid Spring-Knife Handle	John Lingard	Pea Croft, Sheffield.
„ 8	3539	Improved link motion for Steam Engines	Edward Reynolds	Butterley Iron Works, Alfreton, Derbyshire
„ 9	3540	The Commercial Purse	Dent, Alcroft, and Co.	Wood Street, Cheapside
„ 10	3541	Improved Chimney Top	Edward Green	Wakefield, Yorkshire

Journal of the Society of Arts.

FRIDAY, DECEMBER 23, 1853.

EXTRAORDINARY MEETING.

MONDAY, DECEMBER 19, 1853.

An Extraordinary Meeting was held on Monday, the 19th instant, William Bird, Esq., in the chair, for the purpose of resuming the

DISCUSSION

ON THE CONSUMPTION OF SMOKE.

The SECRETARY stated that he had received two communications on the subject of this meeting, one from Mr. Charley, of Belfast, who said that at the Mossvale Bleach Works near that place, owing to the use of Williams's smoke consuming apparatus, with the addition of a little more air at the bridge, there was almost complete immunity from dark smoke; indeed the smoke was scarcely ever perceptible except immediately after firing. At other times the ejection was of a white or pale ashy colour, somewhat resembling steam. The coal used was "Hard Ayr," from Scotland. Among the white linens it was most desirable to prevent dense smoke, and thus avoid stains from colly. The other letter was from Mr. J. M. Dodd, who thought that the simplest and most natural method of obviating the evil, in regard to furnaces employed in various trades and manufactures, was the substitution in such furnaces, of anthracite coal for the other combustible minerals now in use. The non-smoke producing properties of this fuel were thus stated by Mr. R. C. Taylor, in his "Statistics of Coal." "The value of the Welch steam or slightly bituminous coal is enhanced by this quality of burning almost wholly without smoke. . . Steamers burning the fat bituminous coal can be tracked at sea, at least seventy miles. . . It is a complete tell-tale of their whereabouts, which is not the case with those burning anthracite, as the latter kind sends forth no perceptible smoke." A further proof of the applicability of this fuel to the use of large furnaces was to be found in the fact, that the Royal Mail Steam Packet Company had recently undertaken the working of a Colliery in Pembrokeshire for the supply of this fuel to their vessels. Of the value of anthracite as fuel, Mr. Taylor gave the following particulars: "The evaporative power of English coking coal is 7.84lbs. of water to 1lb. of coal. The evaporating power of anthracite is 10.56lbs. of water to 1lb. of coal. The number of lbs. of water to which 1lb. of fuel will impart 1 degree of heat is: Walls End coal, 2,000lbs: semi-bituminous South Wales, 9,000lbs.; charcoal 10,000lbs; anthracite, 12,000lbs." The composition of anthracite might be stated as: Carbon 92.42; volatile matter, 5.97; ashes, 1.61. The anthracite area of the Welsh coal-field extended from the Vale of Neath to Kidwelly, in Carmarthenshire, and, after crossing beneath Carmarthen Bay, again appeared iu Pembrokeshire, and continued all across that country to St. Bride's Bay.

Mr. J. GLYNN, F.R.S., said that, in discussing the subject of the prevention of smoke, it was desirable to keep in view certain questions suggested by the necessities of the case, and by the requirements of the Society. He would allude, in the first place, to the two subjects, Nos. 46 and 47, in the premium list of the Society of Arts for the present session, as embodying roughly what he considered should be chiefly attended to in this discussion. These were:—

"46. For an account of recent improvements in, or applications to, the furnaces of steam engine boilers, for the consumption or prevention of smoke, without increasing the expense of working."

"47. For an account of improvements in the furnaces of manufactories, especially in glass works, iron foundries and the like, for the consumption or prevention of smoke."

It should be remembered that, in 1843, now ten years ago, a Select Committee was appointed by the House of Commons "to inquire into the means and the expediency of preventing the nuisance of smoke arising from fires and furnaces." This committee defined smoke to be:—"First, black smoke, that nuisance to which the attention of the Committee is directed, consists essentially of carbon separated by heat from coal or other substances, and is commonly mixed mechanically with carbonic acid gas, carbonic acid, and other matters." The Committee mentioned six other kinds of noxious smokes and vapours, arising from copper-works, alkali-works, lead-works, &c.; but they directed their inquiry to smoke arising from the imperfect combustion of coal in furnaces—that was smoke in the common acceptation of the word. It was expedient in conducting the present discussion to follow a similar course, and to limit it, in the first instance, to the furnaces of steam boilers, brewers' coppers, tallow melters' pans, stills, and other furnaces of a similar kind, used in large towns, and comprehended under No. 46 in the Premium List; then to go on to the questions arising under No. 47, affecting glass works, iron foundries, smelting works, and the like. It appeared also to be requisite to bear in mind that it had been already decided "that the object to be attained is the production of a perfect combustion to prevent smoke," as given in the evidence of Dr. Ure. (See Report, Answer 98.) The means of preventing smoke appeared to be five; but the methods of applying them varied considerably. They had been applied not only in various ways separately, but in combination, for which many patents had been taken out; and

there still remained a wide field for the exercise of inventive talent and skill in adapting them to the various forms of furnaces, and the uses to which they might be put. The most obvious means of preventing smoke was the substitution of coke for coal, as in locomotive engines, which, by Act of Parliament, *"must burn their own smoke;"* but it was found more convenient to avoid making any. This might also be accomplished by the use of dry Welsh, Kilkenny, Kilmarnock, or other coal of similar character, or of anthracite itself, abundantly found in South Wales, instead of the bituminous coal of Newcastle, Durham, and the Midland Counties. The next plan was to produce a complete combustion of these smoky coals by a due supply of air to the incandescent fuel. For this purpose various methods had been devised by Mr. Charles Wye Williams, Mr. Chanter, Mr. Samuel Hall, and many other persons, some of whom contrived to warm the air before it mixed with the heated vapours; whilst some divided the air as it entered into numerous streams or small jets. Others, again, admitted it through sliding doors and regulators; but the last of these means of supplying cold air, although it might prevent smoke, sometimes increased the consumption of fuel. The third means, which, in a great degree, included the second, was by constantly supplying fuel to the furnace in small quantities, much scattered and divided, so that the coal was not only ignited as it fell upon the fire, but the heated vapours at the same time had a supply of air sufficient to produce their complete combustion. To some extent this might be effected by the careful stoking of a skilful fireman in a well-constructed furnace; but as this constant attention to the supply and frequent stoking of the burning coals involved often repeated openings of the fire-doors, and the consequent admission of cold air in excess, mechanical contrivances had been introduced, which, without opening the fire doors, until it became necessary to raise the fire from the grate bars, and to clear them from the "clinkers" or earthy parts of the coal vitrified by the heat, scattered a constant and continuous supply of fuel upon the fire. In most of these devices there was a hopper filled with coal, and a pair of rollers through which it passed. It then either fell directly on the fire, as in the well-known revolving grate of the late Mr. Brunton; or it was scattered over the fire by the centrifugal action of fans or wings fixed upon the surface of two very flat cones, upon which the coal dropped from the rollers, as in Mr. Stanley's plan, much used in Manchester, where the governor of the steam-engine regulated also the supply of fuel to the furnace, according to the engine's demand for steam. In all these cases, mechanical power was required, and these machines could only be used where a steam-engine was employed, although Mr. Glynn had known some instances where water-wheels had been applied to Mr. Brunton's revolving grates, when no other rotary motion was at hand to work the furnace. It was evident that Stanley's contrivance was very effective, and even elegant in its action, when the steam-engine fed its own fire, and regulated the supply of coal to the demand for steam; but the necessity of care and attention to raise the fire from time to time, and to remove the clinkers, induced Mr. Brunton and other ingenious persons to devise what might be called the fourth means. Before noticing this, however, it might be right to mention that Mr. Godson invented a method of supplying furnaces with coal from below, by forcing up a column of fuel, which was lighted at the top, and caked as it was delivered to the furnace, the column of coals being pressed upwards in a box, as a candle was raised in the socket of a candlestick, or like the wick of a lamp. Although this plan was in many respects satisfactory, it was evident that much inconvenience must attend its application to large furnaces. The fifth means, therefore, might be said to have suggested itself from the imperfections of the fourth. It consisted in giving a longitudinal motion to the grate, by which it fed itself with coal at the furnace mouth, and cast off the clinkers at the tail-end of the fire-bars, the forward motion corresponding with the consumption of the fuel; while, by other motions given to the fire-bars, the mass of fire was broken, or stoked, so as to admit a due supply of air, and the clinkers disengaged from the bars, so as to be readily cast off when they reached the end of the bars. Such plans were Mr. Brunton's peristaltic grate, in which the fuel was digested, so to speak, like food in the stomach of an animal, giving heat and supporting physical power; and Mr Juckes' plan of grate, composed of fire-bars like links of an endless chain, upon which the fire travelled through the furnace. These means, variously modified or combined, had all been exercised, and in some cases with considerable success, to obviate and prevent the discharge of smoke from chimneys into the atmosphere of towns and cities.

In discussing the subject, Mr. Glynn thought the different speakers could not do better than follow the subdivisions of the syllabus, under each of the two heads before-mentioned:—

1. Have the improvements or the apparatus mentioned been in actual use? If so, to what furnaces were they applied, and for what time? Did they prevent the discharge of black or dark smoke from the chimney-tops? If the smoke was visible, to what extent; and if at intervals, when?

2. What was the kind of fuel used before any experiments were tried? What kind of fuel has been used since? What is the difference in the quality and cost in either or both?

3. What kinds of furnaces or grates, or modes of setting, have been used or tried?

4. What kind of apparatus has been applied to prevent the production of smoke? If by the admission of air, state whether cold or heated, and in what manner it was brought into contact with the fuel?

5. What mode of supplying coal to the furnace, or of feeding the fire? What mode of stoking, whether by moving grates or otherwise, and of clearing the bars of clinkers?

6. State the cost of the apparatus, the time it has been in work, and the prospect of its durability from past experience, and the general results arising from its use.

Mr. J. Lee Stevens had the pleasure of attending the last meeting of the Society, when this subject was before them, and wished then to have an opportunity of explaining his patent for preventing smoke, but abstained from doing so, as not pertinent to the paper then before them. He would now, however, in some measure endeavour to do so, and show that it was in practical use, and, he believed, obviated many, if not all, the objections to the introduction of furnaces in large cities. His object had been not to introduce new machinery, but so to adapt old that a common stoker might be enabled to manage it without any great exertion. He in some measure altered the fire-bars, his object being, as far as possible, to prohibit the admission of air from beneath the furnace, trusting to get a sufficient supply above the fire place. He therefore reduced the interstices between the bars from half-an-inch or an inch to a quarter-of-an-inch. The bridge receded from the bars so as to give room for his other arrangements. Beneath the fire bars he had described, he had another range of bars nearer the ashpit. Beyond the end of the upper range of bars he placed a caloric plate, which was prevented coming into contact with the bridge by studs or flanges, and this plate was faced with Welsh lumps, there being 3 or 4 inches between it and the bars; whilst the fire was being lighted, there would certainly be a small quantity of smoke. The fire heated the boiler, and when the fire was stoked the cinders were forced over and heated the current of air, which passed through a fire-box, and not over the bars, it being admitted into the furnace just above the fire-box. In his opinion, notwithstanding the *dictum* of Sir Humphry Davy, the most perfect heat was attainable when the oxygen had been previously heated; for he found that the higher the heat of the oxygen, the more perfect was the combustion of the carbon. It was said that Sir Humphry Davy arrived at the conclusion that the oxygen should be cold because the fire burned brighter in cold weather; but did it never occur to him that the fire burned brighter in the winter because the smoke was lighter, the atmosphere being denser and assisting in the combustion. Mr. Stevens here read a long list of establishments he had supplied with the Patent Smokeless Furnaces, among whom were Keen and Welch, mustard manufacturers, of Garlic-hill; Welch and Margetson, silk dyers, London and Merton; Herring Brothers, manufacturing chemists, Aldersgate-street; Miller, Ravenhill & Salkeld, engineers, Glass house-fields; Vallance & Catt, brewers, Brighton; Gresham-club; Easton and Amos, engineers, Southwark; Courage and Donaldson, brewers, Shad Thames; Bevington and Morris, leather merchants, Bermondsey; Betts and Co., distillers, Smithfield-bars; Earl Fitzwilliam; Billinsgate market, &c. He returned to Billinsgate-market, because it had given great satisfaction to the city authorities, who had favoured him with a further order, notwithstanding its not having proved as successful as it would have done, in consequence of a tube about four inches in diameter having been introduced into the flue from a steam-engine, causing a flow of steam into the flue, and in some measure damping the fires. In answer to questions, Mr. Stevens said that his arrangements were being applied to bakers' ovens, and he hoped shortly not only to get rid of the smoke, but also of the smoky taste which the bread too often had. The cost of the apparatus must depend on a variety of circumstances, such as the form and size of the furnace. If it were a new furnace, the actual expenditure for manual labour would be from 3*l*. to 10*l*., whilst the cost of the new form of furnace would be no dearer than the old. If the furnace was for an engine of four or five horse power, he should say the cost would be about 3*l*.; but if it were of fifty horse power, about 10*l*. As regarded old furnaces, the lowest price at which he had been able yet to adapt his invention, was 5*l*., and the highest, an exceedingly expensive one, for an engine of fifty horse power, 25*l*. With reference to his charges for royalty, he never asked to be paid until the parties were satisfied with the success of his invention. He should say that the saving of fuel with his furnace would be from twelve to eighteen, and thirty per cent., and on an average certainly not lower than twenty per cent. As an instance, he might mention, that when he first put up his furnace at Messrs. Miller, Ravenhill, and Salkeld's, Mr. Salkeld informed him that he was about to do so under an economised boiler, and that, therefore, he need not expect any great saving, the more especially as it was looked after by the best stoker in London, who had a regular supply of coals, namely, three and a half tons for seven days two hours. Mr. Salkeld had since informed him that he was now supplying the same quantity of coals for eight days five and a half hours. Messrs. Easton and Amos, engineers, were about ascertaining the quantity of coal they used in a fortnight, and also the quantity of water evaporated, which he should be happy to supply to the Society when he obtained it.

Mr. J. Gilbertson said he had a plan he invented several years ago, which came very near that patented by Mr. Stevens, and which required little attention in the stoking. It was applicable to breweries, mills, and almost every description of manufactory, and he had had them constructed from six feet to half a foot square. With regard to tallow melters' pans, he had invented, thirty-five years ago, a covering for them, which destroyed the effluvia by passing it through the fire-bars, and it was now very generally adopted. In his plan, a model of which he held in his hands, the bars and cheeks or sides were cast hollow, for the admission of pure air at the bridge or back of the furnace, before the smoke entered into the flue, thus supplying the gaseous products of the fuel with fresh air at a very high temperature, which was necessarily acquired in its passage through the hollow bars and side plates. The effect of partly consuming the smoke commenced as soon as the fire was lighted, and increased as the bars became heated. If ordinary attention was paid to the stoking, all the fuel might be consumed under the boiler by slow combustion, instead of being driven into the atmosphere. By these means a considerable saving would be effected in the quantity of fuel consumed, and there would be less destruction of the bars, as they were kept cool by the air passing through them. He might mention, to show its efficiency, however, that it had been adopted by a Mr. Bridge's, a whalebone boiler, in Houndsditch, and he was enabled to live in his house with perfect ease. His successor, from carelessness or some other cause, discontinued its use, and the result was that he had been indicted for a nuisance and compelled to leave. His object was not now to come into competition with any other parties, but to let them know what simple means there were to abate the nuisance. He might also mention that he had applied his principle of slow combustion with great advantage, in warming buildings, by means of hot air stoves, so that the air, to use an expression of Dr. Reid's, was made to circulate freely through the heart of the house, the whole area being kept at an equal temperature. The

stoves might be supplied with any kind of fuel, and, the damper being nearly closed, no attention would be required for twelve or twenty-four hours. The combustion being supported by the small quantity of hot air passing through the bars, and, as in the other cases, meeting the smoke at the bridge, thus giving a complete illustration of slow combustion.

Mr. D. K. Clark stated that it was important, in working out the problem of smoke-combustion, to keep steadily in view the principles on which it should be solved. He maintained that rapid, or, more properly, intense combustion, should be aimed at in general practice, in opposition to slow combustion; because the higher the temperature at which combustion was conducted, the more readily did the elements combine, and the less excess of air admitted to the furnace was necessary to the complete combustion of the fuel; in so far, the greater would be the economy. Moreover, the higher the rate of combustion, the less seriously did any irregularity of management on the part of the stoker affect the quality of combustion, as an excessive charge of fuel would be more speedily reduced to a manageable condition, for the prevention of smoke. It was fortunate that the comparative efficiency of the fuel was promoted by the same means by which smoke was to be prevented; a great excess of air being as injurious, in both respects, as a deficiency of air. He referred to the practice of locomotive boilers, with which he had had much experience, and he found that, whereas in stationary boilers combustion was usually conducted at a rate of from 10lbs. to 20lbs. of coal per square foot of fire-grate per hour, in locomotive boilers it was usually from 50lbs. to 100lbs. per foot per hour, or five times as much. Engine drivers would consider the low rate in stationary boilers mere trifling, and it was certain that the high rates of combustion achieved in locomotive practice, were as favourable for evaporative economy as the low rates employed in stationary practice. By judicious firing, from 8lbs. to 10lbs., or even 11lbs., of water could be evaporated per pound of coke; and, indeed, the evaporative economy was regulated rather by the proportions of the boiler than by the quality of the combustion. And, to show how this rapid combustion referred to facilitate the prevention of smoke, Mr. Clark referred to the simplicity and efficiency of the means employed by good engine drivers in burning coal. They placed the coal, in lumps, close to the back of the fire-box, just under the fire-door, and opened the fire-door a half inch or so, for the admission of air; and, occasionally also, particularly in approaching stations, and while standing there, they closed the ash-pan damper, and opened the fire-door more widely. The ash-pan and damper under the fire-grate were very simple, but very important; and it was essential for their proper action that they should be well fitted together, and to the fire-box, so as to work air-tight, when required. By these simple means alone the drivers could consume a large proportion of coal with the coke, and in some cases coal entirely, without any material evolution of black smoke. He referred to some other incidental advantages of rapid combustion. In locomotives it was found that smaller boilers were required to do the same work when the combustion was more rapid; the grate, of course, being smaller, as the more intense heat was more rapidly absorbed, and less heating surface was necessary. He could not dwell too much on the importance of this result, for, in localities where space was valuable, much more compact boilers could be used, and equally powerful with those now used. The Cornish boiler, with its very large grate, and very slow combustion, was quoted as a conspicuous example of the necessity for very large boilers under such conditions. A locomotive boiler occupying a space not more than four feet wide, and sixteen feet long, would develope 300 or 400 horse power; and the chimney was only five feet long, and twelve or fourteen inches diameter! There was nothing to prevent the proprietors of non-condensing engines blowing the waste steam into the chimney, as in locomotives, and thus accelerating the draught. In condensing engines, some other appliance must be employed for this purpose.

Mr. Manning laid before the meeting a hollow fire-bar, a French invention, which had been put up at the Polytechnic, for 1*l*. 16s., and which, by the introduction of heated air through the bars, would effect a saving in fuel, of 10, 15, or 20 per cent. The hollow fire-bar had been in use at one place fifteen months; it perfectly consumed its own smoke, and produced no clinkers.

The Chairman said that on a recent visit he had made to the iron works in Styria, he found they used a fuel consisting of lignite, or brown coal; his attention was drawn to the fact that they used sloping bars, run across in the contrary direction to the usual plan, to support the fuel, which gave a better draft, very little smoke escaping from the chimney. He believed, by a simple arrangement of sloping bars, they might arrive at a close approximation to what they wanted. In the arrangement to which he alluded, the boiler was fixed in a small brick arch, under which was the furnace. The fuel was thrown in by a hopper, and slid down the bars, which were only a quarter of an inch apart, and the air was so admitted as to give a most perfect combustion. If the fuel were loose, it fell down, and there was a shaft by which it could be regulated.

Mr. Siemens said he had but little to add to his observations on the previous evening. Mr. Clark had spoken in favour of rapid combustion; while Mr. Gilbertson, on the other hand, contended for slow combustion. He (Mr. Siemens) thought that both views, though opposed to each other, could be reconciled with sound practice under different circumstances. Mr. Clark's observations had chiefly reference to the condition of the locomotive boiler, where it was important to obtain the greatest evaporation within a limited space, and where almost unlimited draft could be artificially produced by means of the blast-pipe. The draft of furnaces under land boilers, coppers, &c., depended, however, solely on the comparative lightness of the ascending column of the products of combustion, or on the amount of heat which they carried with them into the chimney. Considerations of economy here imposed slowness of draft. The available draft had, moreover, ordinarily to be diminished by means of the damper, in order to accommodate the generation of steam to the exceedingly variable demand. A good furnace ought, therefore, to effect perfect combustion at quick and slow draft. It was, however, generally admitted, that perfect combustion could only be attained at high temperatures. Mr. Siemens found that the furnace with slanting bars, which he had previously described (and of which he made a diagram at the request of the chairman), fulfilled the required conditions. It should, however, be furnished with the simple means he had suggested of regulating the inclination of the bars. In reply to a question from the chairman, Mr. Siemens said he believed the idea of slanting bars originated with the great James Watt, and was mentioned in one of his patents. Mr. Hunt, of Stoke, near Birmingham, had patented some details of arrangement. The slanting grate, with horizontal steps like a staircase, which the chairman had seen abroad, was, he believed, the invention of Dr. Kufahl, of Berlin, and answered very well for burning "braunkole," a fuel holding a medium position between coal and peat.

Mr. Lee Stevens forgot to mention, that a part of his plan was to use sloping bars, and that the combustion of the coal was increased in proportion to the heat of the parts of the furnace through which the air passed.

Mr. Chanter had worked a similar arrangement to that mentioned by the Chairman, on a locomotive engine, about 12 months ago, between Liverpool and Manchester, but found that it required a strong artificial draft. It worked admirably while the engine was in action, but as soon as it was stopped, it poured forth large volumes of black smoke.

Mr. W. Bridges Adams remarked that all the mechanical processes had reference to one result, namely, distilling the volatile matter and passing it over incandescent fuel or other heated matter, and that it was a problem worth considering whether this could not be done better previous to putting the coal into the furnace; in short, manufacturing the fuel to its desirable chemical and mechanical condition before applying it to feed the fire. The objection made to this was, that coal was a much cheaper fuel than coke. But this went upon the assumption, first, that coke was the only kind of prepared fuel, and next, that in making the coke the volatile matters were to be wasted—a conclusion not finally settled, unless we supposed that coke-making had arrived at perfection. To ensure perfect combustion, it was requisite that oxygen be mixed in due proportion with the carbon, hydrogen, and other gases. To accomplish this mixing, it was essential that the fuel be provided with interspaces, or choking would ensue. The fuel would not digest. The oxygen was to the fuel in the furnace what the gastric juice was to the food in the stomach. If the food be granular, as fermented bread, the gastric juice would penetrate it, and the digestion would be rapid. If the food be a glutinous mass, like mashed potatoes, the gastric juice would only act on the exterior, and the digestion would be slow. As there were certain vegetables and fruits that we could eat raw, so there were certain natural fuels that we could burn raw, as dry wood, anthracite coal, cannel coal, lignite, etc. Their mechanical structure was such that the atmospheric air got free access to permeate the burning matter. But with bituminous coal the melting process shut out the access of the air, as mashed potatoes shut out the gastric juice, and indigestion or smoke ensued. So also, if the anthracite were too friable, it broke into small pieces, and choked or fell through the bars, and gave off the heat, so that the fire went out. Coke was coal artificially formed into the mechanical condition, best adapted for the action of the oxygen. Its irregular form insured permeation, and its solidity enabled it to give out a large mass of heat, while the absence of crystalline texture prevented its flying to pieces. It was a tough fuel, without being pliant or inclined to melt. The problem to solve was, how, without wasting the gases, as in the coking process, to put the coal into the same mechanical condition as the coke. The screens on the Thames accomplished this by bringing the coal to the size of road metal—a condition advantageous to the fire when first lighted, but which, in bituminous coal, was quickly altered. There was an exact proportion of oxygen required to pass through a given quantity of coal to ensure combustion; less than this quantity would be inefficient; more would be mischievous; and it was easy to imagine that a strong current might put a fire out instead of feeding it. But to feed the fire most efficiently, it was desirable that the fuel and air also should be heated, and the advantage would be precisely that obtained by the hot-blast—an intenser heat. It was quite clear that a careful stoker or a machine were competent, so to apply the coal as to distil it into coke, and pass the product over the red fuel and burn it; but this was only a question of factories and steam vessels, with a regulated amount of work. In the steam vessels the machine was of most importance, for it would save the human lungs from much suffering. But making factories smokeless would not cure the great mass of kitchen chimneys, twelve of which, "Punch" said, were equivalent to a camphine lamp. The domestic smoke was the evil which would remain when the factories nuisance was abated; for who could go about from house to house to collect evidence against all these separate nuisances. It was not imaginary. During the summer season he was travelling along the coast towards Brighton. A dense cloud at the distance of fourteen miles made him ask the driver if that portended rain. "No," was his reply, "that be Brighton smoke." As Brighton was not a place of factories, and the brewers used, it was said, smoke consumers, it was clear it was domestic smoke. The question therefore resolved itself into whether all private houses were to be furnished with smoke consuming apparatus, as with Cutler's stoves, to light the fire on the top of a mass of coal, and burn the smoke as it arose; or to induce coal owners to manufacture a fuel which would dispense with any extraordinary arrangement. It was probable that the mechanical admixture of bituminous coal with anthracite in small blocks, would produce a something analogous to cannel coal. It might be dear at first, but experience and competition would soon cheapen it; and, moreover, every portion of the fuel would be consumed, instead of large masses being piled up in waste. Some years ago it was a cussom to use what were called fire balls in open fires. They were balls of fireclay, about 4 inches in diameter, and pierced with several holes three-quarters of an inch diameter, in opposite directions. They thus formed hot air spaces of indestructible material, and appeared well calculated, if placed at the bottom of a furnace, to save the bars from destruction; but he was not aware that they were ever used in that way. They were worth the trial. In order to make the law of smoke consuming effective and self-acting, he did not see any mode so probable as the examination of the fuel. To keep watch over all the houses and factories of London, to be sure of catching offenders, ensured an endless source of disputes as to fact, making it almost an impossibility. To enact a law taxing smoke-making fuel might seem a hardship, while people declared their willingness to burn it carefully with good stoking; but if it were proved that the carelessness of the general community defeated the object of the Smoke Act, there could be no remedy but to attack the root of the evil, and tax imperfect fuel. (a)

Mr. Payne believed the proposal of Mr. Adams would be a beneficial arrangement but for the cost, as those who used coke in their machinery knew how expensive it was. It required 26 cwt. 2 qrs. of coal to make one ton of coke, and it had to burn 48 hours. He maintained that the only perfect smoke-consuming furnace must have a rotatory movement and machine working. Jukes's furnace was the most perfect, and burnt to white heat under the shaft. All the gases were perfectly evolved, and gave the flame a complete vitality, instead of the dulness produced by a coke fire. He did not say that Mr. Lee Stevens's invention did not possess merit, but it could by no means compete with Juckes's. There were also other furnaces of some merit, but nothing could equal the rotary furnace with machine working.

Mr. Sorrell had turned his attention to the subject about two years since, and the first idea he formed of it was to draw the smoke by a shaft through the fire, not knowing that a patent had been previously taken out for a similar arrangement. He applied a fan and a sliding

(a) Since making the above remarks, I have had put into my hands a small work, by Mr. W. M. Buchanan, of Glasgow, with the very modest title of "Notes towards a Solution of the Smoke-Nuisance Question."—(Joseph Griffin and Co., Baker-street, Portman-square.) It is the work of a true mechanical and chemical philosopher, and I trust this may be the means of making it widely known to all those desirous of really mastering the subject. Mr. Buchanan clearly shows that all modes of distilling or coking coal in the furnaces are necessarily imperfect and that distilling the coal beforehand—if the products of distillation were made available—would in no way increase the price of fuel. In fact, we might get light and fuel out of the same material, just as both oil and tallow are produced from the cocoa-nut. Still, as the "fireside" requires a "living fire, a picture-making fuel, with lambent flame and radiant heat, the probable solution of that question will be the mechanical as well as chemical preparation of the fuel. The time will come when we shall eschew raw fuel for our fires as we do raw food for our stomachs. It is some years since, in the pages of the "Westminster Review," I arrived at this conclusion, but can still see no way of ensuring the use of smokeless fuel, save that of a tax on the smoking, before it reaches and is lost in the coal cellar.

W. B. Adams.

flange to about the middle of the shaft, one end of which was connected with the side of the shaft near the damper, and the other with the atmosphere, thus diminishing or increasing the quantity of air admitted. He first tried it with one boiler, opening the furnace at the foot to let out the carbonic acid gas, and he then tried it with two boilers connected with each other, stoking the fires alternately, the smoke from the one being passed through the other. This arrangement acted tolerably well, only it wasted the fuel. He still, however, thought it the best for brewers' coppers. He afterwards tried another plan, by making a communication between the door and the back of the bridge. When the door was closed he found this did not act exactly as he wished, and he put a square band round the bridge, perforated with holes. This was most effectual in curing the smoke, but it had this disadvantage—in a short time the holes got filled up and it would not work.

Mr. E. A. Cowper wished to know whether Mr. Jukes's furnace was applicable to manufactories where high heats were required.

Mr. Fraser believed that it was, for in one case within his own knowledge, the heat had been sufficient to vitrify the fire bricks at the sides of the furnace.

Mr. Walenn thought that there was a class of furnaces to which all the inventions brought before them would be more or less inapplicable, he meant chemical works. In Staffordshire, where other products as well as those of coal were thrown off, it was necessary to have some means of getting rid of them, and this was effected by dropping water like rain down the chimneys, thus sending down the carbonaceous and sulphurous particles into a pit prepared for them. He did not know how far this system might be applied to other manufactories or domestic fireplaces. He thought, however, if the coals could be used as if the stoves were turned upside down, and thus distilled through the rest of the fire, the smoke would be destroyed. Perhaps the most effectual method of consuming the smoke, would be by the introduction of hot air, which might be effected by the adoption of hollow fire-bars, in the ends of which should be introduced a small piece of gas-tube, as an air pipe, carried up on the side of the bridge.

Mr. Powell wished to make only one remark. Mr. Juckes had been to their glass manufactory at Whitefriars, and admitted that his invention would be perfectly inefficient if applied to glass works.

Mr. Wilson had made some experiments of late with large and small coal, and he found that by Hazeldine's rocking bar a saving of 12 per cent. in the fuel was effected, which he thought a sufficient economy to recommend the invention to notice.

Mr. Pettitt having expressed his opinion in favour of high combustion, drew attention to a plan of continuous furnaces for glass works, smelting works, and the like, by which the waste gas of each passed through the next; so that, supposing there were twelve, the smoke of eleven would be consumed, that of the last only escaping into the chimney, while 60 per cent. of coal would be saved.

Mr. Varley wished to call attention to what had been previously brought before the Society. Some years since the Rev. Mr. Budge brought forward a plan which he learned from a common chimney sweep, by which there was a descending shaft leading into a chamber, from which there was an ascending flue. The result was, that all the carbon was deposited in the chamber, from which it was liberated by a door, and none of it went up the chimney, as was proved by the rev. gentleman having it swept two years after the plan was put in operation.

Mr. Eckstein observed that the smoke had been got rid of in Sir Henry Meux's brewery by the use of anthracite coal mixed with a very small portion of bituminous.

Mr. R. Davison reviewed several systems which had been introduced, and expressed his opinion that there would be little need of machinery if a proper system of stoking and admission of the atmospheric air were attended to.

Mr. Chanter stated that he had put up a reciprocating fire bar in an extensive manufactory 14 years ago, and it was still in good working order. He had put up nearly 400 of these bars within the last two years, at sugar refineries and other places, and they had been found very efficient. He had lately put up one 8 feet 6 inches in length, at Hoare's brewery, and he believed he should be shortly enabled, with the assistance of his friend Mr. Mackenzie, to add a self-feeder.

Mr. Jackson had a plan, which, if not equal to that of Mr. Juckes, had worked very satisfactorily, and was much less expensive. He divided the furnace into two parts, by a partition from the bridge to close to the door. To either division there was a damper. He stoked one part by itself, when, the damper being closed, the smoke was sent over to the other part and consumed. He then closed the door, and when the smoke was consumed, and the coal in active combustion, he applied the same process to the next division, the smoke being thus effectually destroyed.

The Chairman said he believed a similar plan was published in 1841.

Mr. Chanter might observe it was in operation at Messrs. Fairbairn and Son, Mr. Mordant's, and other places.

Mr. Davison here read an extract from a lecture of Mr. Fairbairn, to show that, if the stoking was properly attended to, no machinery would be required to assist in the consumption of smoke.

After a few observations, in which it was stated that Mr. Juckes', and Messrs. Bristow and Attwood's patents were in successful operation at Messrs. Ponsford and White's,

Mr. Chanter said he was convinced, if the manufacturers would give their stokers a little extra pay not to make smoke, and fine them when they did, there would be no necessity for smoke preventors or smoke consumers.

Mr. Hocking had always found it to his advantage to employ educated stokers, and pay them accordingly. In Cornwall they had never thought of preventing smoke, but they had thought a great deal about saving fuel.

Mr. Austin wished to call attention to an analysis which he had made from "The Builder," relative to the results of five different experiments on the working of two forty-horse power boilers. The consumption of coal in each experiment was 26 tons. In the first, 49 hours were occupied in its combustion; in the second, 54; and in the third, 64. In the first experiment, 107 feet of water were evaporated in the hour; in the second, 117; and in the third, 128; the quantity increasing with the increased consumption of coal. The weight of coal consumed per horse-power per hour, was, in the first experiment, 15lbs.; in the second, 13¼; and in the third, 11¼; and the refuse in ashes respectively 30 cwt., 28¼ cwt. and 26 cwt. The first experiment was tried by the exclusion of as much air as possible, the second by its admission, and the third by the admission of air and thick fires; and the cost of fuel to the 100 feet of water evaporated was, in the first experiment, 3s. 6d.; in the second, 2s. 11d.; and in the third, 2s. 2d.; showing the advantages of the slow over quick combustion. In the fourth and fifth experiments the same quantity of coal was used, but a large portion of it was slack, the average cost being 4s. 9d. against 7s. in the previous experiments; and in these instances, instead of a cost of 3s. 6d., 2s. 11d., and 2s. 2d. per 100 feet of water evaporated, they came out at 2s. and 1s. 10½d. respectively. He believed it was generally a false economy in not using coals mixed with slack, as, though it produced more ashes, in many districts they were valuable as breeze, to mix with liquid manure.

Mr. Taylor alluded to the evidence given before the committee of the House of Commons, in 1820, as he was sure it would be well worth perusal.

Mr. Joseph Glynn said that in the course of the dis-

casion the injection of steam into the furnace had been suggested as a means of preventing smoke. Now, it had long been known that no beneficial effect could be produced by the use of steam, unless it were applied by means of a "blast-pipe," to accelerate the current upward through the chimney, and consequently to quicken the passage of air through the fire grate. The same idea was brought before the Parliamentary Committee of 1843, who examined and disposed of it then. The fire grate with bars sloping from the furnace mouth, and inclined at a considerable angle, was used by Mr. Watt for the first steam-engines he erected in London, at the Albion mills. An engraving of the boilers and furnaces was given in Dr. Robinson's "Mechanical Philosophy." Watt also used a "feed mouth," in which the coal was ignited and partially coked, the heated vapours flaming as they passed over the clear fire. The fuel was then pushed gradually forward to supply the consumption of the furnace, and the clinkers, by the act of stoking, discharged into the ashpit. Mr. Watt afterwards had the walls or fire-bridges behind the grates of his furnaces built hollow, with apertures at the top, to admit the air which entered from the ash-pit after passing over the hot ashes and clinkers. Thus it was evident that he understood, and to a considerable extent practised, much that was now brought before the public as new.

The CHAIRMAN said that, from all that had come before them, excellent as many of the inventions were, there was nothing to excel good stoking. There was no question that a better education in their business would be of advantage to stokers. He hoped the various inventors would favour the Council with a list of the places at which their respective inventions were in operation, when they should be examined and tested by a Committee of the Society, who would make a report of the results of their inquiry in the course of the session.

SIXTH ORDINARY MEETING.

WEDNESDAY, DECEMBER 21, 1853.

THE Sixth Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 21st instant, HARRY CHESTER, Esq., in the Chair.

The following candidates were balloted for, and duly elected :—

Adams, William	Newall, Henry
Brookes, William	St. David's, the Right Rev. the Lord Bishop of
Child, George	Williams, Charles Croft
Harding, John Thomas	Woolmer, Shirley Foster
Logan, William Crauford	

The following Institutions have been taken into Union since the last announcement:—

316. East Retford, Literary and Scientific Institution.
317. Redruth, Institution for the Promotion of Useful Knowledge.

The first Paper read was :—

ON PETTITT'S FISHERIES GUANO.

BY HORACE GREEN.

IN introducing to the notice of the Society the subject of the artificial fish guano, it may not be superfluous to allude to the natural substance which has in so short a period of time, scarcely fifteen years, taken so firm a hold of public opinion, and so won its way to the favour of the agricultural interest, that it has been proposed to our Government to exert pressure on a minor state in order to secure cheaper supplies; and our national navy carries general orders to search for and report on new deposits of it. It is questionable whether the gift of guano, which has been so profitable to the credit of the Peruvian state, might not prove a fatal gift, were there a certainty of the supply being permanent; and, as the case stands, we cannot say whether the jealousies of rival customers for this singular article of national wealth may not increase as the guano islands diminish, and bring fresh trouble on the already distracted republics of the Pacific.

Guano, it is generally understood, was introduced to the notice of Europeans by Von Humboldt, in 1804. It was brought to England as an object of merchandise in 1839. It had been used in Peru for six hundred years and upwards, and the island depositaries had been for ages under the management of the state. Its early history is too well known, through the lectures and essays of Professors Johnston, Way, and others, to need repetition. The only points of the evidence of the earlier witnesses on this subject to which we need now refer, is that, even in those days, the flocks of birds, being disturbed by the operations of the traders, had begun to desert the islands, and that the annual new deposits were regularly swept off for the home consumption of Peru. These points will be referred to presently. With reference to the early price: in 1841, Mr. Johnston, to whose papers every person interested in the question naturally refers, gave the price of guano as 25*l.* per ton in this country, and not more than 2*l.* 5s. to 3*l.* 10s. on the spot; and having given an analysis, and calculated the price at which the same amount of fertilising matter might be added to the soil from the manufactories of this country (say 9*l.* 10s.), he deduced that the British farmer should not be called upon to pay more than 20*l.* for his ton of Peruvian guano, and should certainly refuse to do so. Mr. Philip Pusey, then president of the Royal Agricultural Society, in a paper on the subject in the journal of that body also gives the same opinion, and without doubt the very rapid adjustment of the price to the sum of 9*l.* 5s. per ton may be taken as a prudent acknowledgment by the Peruvian agents of the very forcible nature of the Professor's argument.

Of the excrementitious matter voided by the sea-birds, a very large proportion is decomposed before the guano of commerce is extracted from its beds, and more still before its arrival in this country. More than four-fifths of the weight of the original droppings of the fowl pass away in the slow process of decay, and a very large proportion of *value* escapes in the decomposition of the urea of the recent excrement into the salts of ammonia of the imported manure. This accounts for the high price set on the recent or white guano on the coasts of Peru at present, and

naturally also draws attention to the consideration of the time occupied in the formation of such deposits. The expressive words of Professor Johnston on this point may be here introduced: "We are astonished; even geologists who are familiar with extended periods of time, and are accustomed to contemplate immense results produced by the prolonged action of apparently insignificant causes,—even geologists are struck with the occurrence on the existing surface of the globe, of such vast accumulations of excrementitious matter; yet how are our ideas still further magnified, both in regard to the number of birds necessary to deposit them, and to the lapse of time during which they must have been gathering, when we learn that what now remains is not, either in bulk or weight, more than one-eighth or a tenth part of that which originally fell from the living sea fowl." Proof of the rapid depreciation of guano in keeping may be found in the analyses of the dung of birds by M. de Coindet and Sir Humphry Davy. Coindet found in recent excrement.

Of pure ammonia	8·61	per cent.
Of ammonia, in the form of its equivalent of uric acid	35·20	"
Total	43·81	per cent.

Davy found that the soluble matter of the dung of pigeons (which it will be remembered were formerly protected here by statute) decreased from 23 per cent. in the recent excrement to 16 per cent. in that of six months' old, and to 8 per cent. after fermentation.

It would appear that, until the opening of the trade in guano, the Peruvians had confined themselves mostly to the use of the new deposits, and had used up annually, or nearly so, the supply provided for them, because we have not received from Peru any guano as rich as new deposit would be, nor indeed as is imported from Bolivia and other entrepots of very minor capabilities; and the earlier imports, as being nearer the surface of the solidified deposits, were inferior to that which arrives at the present time. It is more than likely that solid masses, nearly in a virgin state, not having been cut into by the Peruvians, were attacked with pick and spade to load the earlier ships. As the work went on, the diggers arrived at harder strata, enriched at the cost of those above by the filtration of ages, and so consolidated as to require in some places the operation of blasting.

Notwithstanding the conflict of opinions on this subject, it is generally believed that the zenith of supply from Peru is past. We are aware that there is an increasing demand, and yet there is so marked a falling off in the import, that the following notice on the subject appeared in the columns of the *Times* of August 25, 1853:—

"Imports and Consumption of Guano.

"A calculation has been made by the importers that the consumption of Peruvian guano in Great Britain is now from 190,000 to 200,000 tons a-year, and the increase is said to be from 15 to 20 per cent. annually. Scotland consumes largely, but Ireland very little. At present the unrestricted system of adulteration operates greatly to its disadvantage. The imports into the United Kingdom during the last five years have been as follows:—

1848............	71,415 tons	1851............	243,014 tons
1849............	83,438 "	1852............	129,889 "
1850............	116,926 "		

"The countries from which it was imported, and the quantities brought from each, last year, were as undernoted, 36,247 tons of which were re-exported:—

Peru............	86,293 tons	Buenos Ayres.	932 tons
Chili............	11,191 "	China...........	790 "
Patagonia......	7,282 "	Australia	727 "
South Africa..	7,273 "	Ascension......	705 "
Bolivia.........	6,213 "	Brazil...........	650 "
W. C. Africa..	4,192 "	Eight other places	703 "
Uruguay.......	1,575 "		
E. C. Africa...	1,363 "		129,889 "

"The stocks of Peruvian in this country are now stated to be almost *nil*, and of the *inferior sorts* altogether not more than 10,000 tons, one moiety of which is housed in the port of Liverpool—say 5,000 tons—value 40,000*l*. The imports of last year appear to have been in value 1,180,000*l*. The imports of the present year, so far, are a mere bagatelle."

So it appears that in five years nearly 650,000 tons of Guano have been brought almost round the world for the stimulation of the soils of this country. This may have been the result of six times the quantity of excrementious matter or not. Let us take it as it is at rather more than half a million, and we may well imagine, considering that the agriculture of Peru and Chili (the only rainless depositaries), has, for all recorded times, to a great extent availed itself of the fresh-made guano, which does not form annually a stratum half an inch deep, we may well imagine that the store or reserve of ages has been severely trenched upon.

We see the amazing falling off in the imports from Peru, in the face of an increasing demand. We have seen the entire exhaustion of the Ichaboe islands in 1845, 1846, and 1847—a short space of three years—and we may therefore well turn attention to new sources of supply of this concentration of fertilising matter, before considering of home-made aids or substitutes. Of the 129,000 tons imported in 1852, 97,484 were from Peru and Chili, and 6,213 from Bolivia, or, together, 103,697. The Bolivian guano is of excellent quality; it is, in fact, collected as it falls; there is not, therefore, the shadow of a probability of its being a material stop-gap should the Peruvian supplies run short. But for the other depots little can be said. In the previously named places, no rain falls, but in most of the sources of the 26,000 tons unaccounted for, the virtue of the guano has been washed out by intense and long-continued tropical rains. Out of many analyses of guanos, one or two may be presented to carry out the argument. We may avail our-

selves with the greatest confidence of those furnished by Professor Way to the Royal Agricultural Society, and may safely trust to the accuracy of Johnston, Anderson, Teschemacher, and Nesbit. There appear to be Saldanha Bay Guano, Patagonian, Australian, and East Indian, of which last fresh deposits have been recently brought to the notice of the public. The percentages of ammonia are as follows, being the mean of several experiments with each variety:—

In Saldanha Bay	1.68	per cent.
In Patagonian	2.55	„
In Cape and Algoa Bay . .	2.00	„
In the New Islands . . .	1.96	„

But in phosphate of lime, which is the next most important element, these guanos are richer as they are poorer in ammonia.

The mean amount of phosphate of lime is:—

In Saldanha Bay . . .	55.40	per cent.
In Patagonian	44.60	„
In Cape and Algoa Bay .	20.00	„
In the New Islands . . .	62.80	„

And this will be the case in all guanos which shall be found where the rain falls upon the deposits, which never occurs in Peru.

Now, as respects the position such guanos are likely to take as a substitute for, or side by side with, the Peruvian, there is but little chance of their being much used until the extinction of the supplies of the latter, except for the purposes of adulteration. There may chance to be large imports, but it is questionable whether, if imported, they will enter into consumption throughout the country under their true colours as phosphatic manures, or the disguise of Peruvian guano. It is more than probable that many of the practical farmers who now lay out a little money annually in guano, will continue to be guided, as at present, by the smell of the article, which a mere trace of ammonia is sufficient to provide for them; and they will possibly buy up the New Islands of guano phosphate, if it may be so called, at a higher rate than they need pay for super-phosphate of lime manufactured at home from bones, coprolites, apatite, and phosphoritic rocks. But the question arises whether or not large quantities of such manures can be brought and sold at a price which shall not exceed the home cost of super-phosphate of lime. This may be doubted, although Saldanha Bay guano *has* been sold at 4*l*. 10s., but not very extensively or direct to consumers. There is a difference between the price first-hand from importer to dealer and that from the dealer to the farmer. Still the first importer will never get more than ¾d. or 1d. per lb. for his phosphate, at which price the English tradesman can manufacture it for his own use from the substances above-named; and although some few ships might be found which would take in guano as ballast from the southern seas, &c., still it is hardly credible that the shipping interest would find it worth while to send vessels expressly on long voyages for an article which could not realize a higher price than that above-mentioned. If this be true, it being also established by the labourers in the field of agricultural chemistry, that the wheat-grower is to seek nitrogen in ammoniacal manures, which these new discoveries certainly are not, the conclusion only remains that the void in the supply of guano has yet to be filled up.

Doubtless, the foregoing, among other considerations, led to the proposition, which emanated in the following form from the Royal Agricultural Society of England:—

GUANO SUBSTITUTE PRIZE.

"I.—TERMS OF THE PRIZE:—Proposed by Mr. Fisher Hobbs, seconded by Colonel Challoner, and unanimously adopted by the Council on the 7th of July, 1852, subject to such conditions as the Council, on the recommendation of a Special Committee, then appointed, might afterwards approve.

"ONE THOUSAND POUNDS and the GOLD MEDAL of the Society will be given for the discovery of a manure equal in fertilising properties to the Peruvian guano, and of which an unlimited supply can be furnished to the English farmer at a rate not exceeding five pounds per ton." (Signed) DUCIE, President.

II.—CONDITIONS OF COMPETITION:—agreed by the Special Committee at a Meeting held on the 10th of November, 1852—

2. That in the offer of 1,000*l* and the Gold Medal of the Society, as a prize for the discovery of a manure equal in every respect in its fertilising properties to Peruvian guano, the 1,000*l*. shall be offered in one undivided sum.

2. That the standard of such Peruvian guano shall be assumed to be the average result obtained by Prof. Way, the consulting-chemist to the society, and published in his paper in the 10th volume of the Journal, pages 205—208.

3. That each competitor claiming the prize shall send in with his sample a chemical analysis under seal, together with such practical proofs of the successful application of the manure to the growing crops of grain, roots, and grasses, as he can produce, duly certified by growers. That such samples of manure shall be liable to be subjected to all such further tests, and for such period of trial, as the Council may deem requisite.

N.B.—All claimants shall, on application made to them by the Secretary, be expected to supply, free of expense to the Society, such quantity of their respective manures as may be required for trial.

"4. That no claim for the prize will be entertained unless the claimant can satisfy the Council that an unlimited supply of the manure at a price not exceeding 5*l*. per ton, will at all times be within the reach of the agriculturalists of the United Kingdom.

(Signed) JOHN VILLIERS SHELLEY, Chairman.

III.—CONFIRMATION BY THE COUNCIL:—These conditions proposed by the Committee were approved and unanimously adopted by the Council, at their monthly meeting, held at the Society's house in Hanover Square, London, on Wednesday, the 1st of December, 1852."

(Signed) ASHBURTON, President.
JAMES HUDSON, Secretary.

All prizes offered by the Royal Agricultural Society of England are open to the general competition.

Great doubts have been expressed whether any person who had made such a discovery would

be induced, for a premium of 1,000*l.* to guarantee the sale in unlimited quantities for 5*l.* per ton, of an article equal in value to the Peruvian guano, which bears a market value of 9*l.*, and which, according to the Society's own scale, is worth intrinsically more money. As a matter of course the manure sold for 5*l.* must be supposed to be made for less, and it is difficult to imagine, that he who should, for about 4*l.* 10s., become possessed of

				£	s.	d.
388lbs. of	Ammonia,	worth at	6d.	9	14	0
540 „	„ Phosphate	„ „	¾d.	1	13	9
78½ „	„ Potash	„ „	2¼d.	0	14	8
			or altogether	£12	2	5

would dispose of it for £5.

In his most interesting paper on the composition and value of guano, from which the Agricultural Society draw their standard, Professor Way has considered all known sources of the above-named articles, and has fixed the value of them in manures, after accurate investigation of their prices in the market of commerce. His reasoning is so conclusive, that we can do no other than follow the Society in adopting it; but as, from the fourth condition before recited, it appears that an inventor would have to guarantee the course which traders and manufacturers might adopt, it really appears almost improbable that the Royal Agricultural Society's prize will have to be awarded. However, good has been done, and as to do good was undoubtedly the object of the honourable society, it is to be hoped they will be richly rewarded by the number of propositions for the manufacture of artificial manures submitted to them by inventors stimulated by the prospect of the profitable prize and the medal of honour.

It is now proposed to describe the fisheries guano of Mr. Pettitt, discarding, for the time being, the question of its superseding Peruvian. Mr. James Caird, well known as the Agricultural Commissioner of the "Times," has forcibly remarked, that the number of acres of wheat in England is five millions, and that is exactly the number of quarters of wheat and flour annually imported; and that, by the application of 2 cwt. of guano to each acre, the deficient quarter of produce might and ought to be raised. Were this advice acted on, to a very moderate extent, there would be evidently required 500,000 more tons of fertilizing matters annually—a quantity which would give a fair field for all the guano dealers, all the manure inventors, and all the sewerage purifiers in this country.

It appears needful, in illustrating Mr. Pettitt's proposition, to consider the following points or queries:—

1st.—Can the fish guano be made of use and value?

2nd.—Can the raw material—fish—be obtained in sufficient quantities?

3rd.—Can the process be carried out at such cost as to leave a profit?

4th.—Will there be a sale for the article when made?

To the first query, supposing the science of agricultural chemistry, as at present established, to be sound, the following analyses furnish an answer:—

ANALYSIS I.

By Professor J. Thomas Way, of the Royal Agricultural Society.

Analysis of a Sample of Manure from Mr. Green, received 9th March, 1853.

	per cent.
Moisture	4.28
Oily matter	19.78
Other organic matter and salts of ammonia	62.14
Sand, &c.	2.27
Biphosphate of lime, equal to 3.12 neutral phosphate	2.11
Neutral phosphate, insoluble in water	0.61
Hydrated sulphate of lime	5.00
Alkaline salts and loss	3.81
	100.00

Nitrogen 9.14 per cent.—equal to ammonia 11.09.

ANALYSIS II.

By Professor Way.

Analysis of Manure (No. 201) from Mr. Horace Green—received 29th March, 1853.

	per cent.
Moisture	4.93
Oily matter	3.42
Other organic animal matter and salts of ammonia	84.94
Sand, &c.	1.35
Phosphate of lime	0.39
Phosphate of potash and sodium, with a little chloride of sodium	3.67
Sulphate of potash and soda	1.30
	100.00

Nitrogen 13.82 per cent.—equal to ammonia 16.78.

Total quantity of phosphoric acid equal to phosphate of lime, 3.36 per cent.

ANALYSIS III.

By Lewis Thompson, Esq., M.R.C.S., Consulting Chemist.

	per cent.
Organic matters, containing 12.9 parts of ammonia, equal to 50.1 of sulphate of ammonia	72.50
Inorganic matters, containing 23.2 parts of phosphate of lime and 2.2 of alkaline salts	25.40
Moisture	2.10
	100.00

The alkaline salts contained some potash.

ANALYSIS IV.

By J. C. Nesbit, Esq., Consulting Agricultural Chemist.

Analysis of Sample of Fish Manure from Mr. Pettitt, 145, Upper Thames Street.

	per cent.
Moisture	3.68
Organic matter and salts of ammonia	74.82
Silica	0.30
Phosphate of lime	15.84
Phosphoric acid, soluble, equal to 0.8 phosphate of lime	0.39
Alkaline salts and phosphate of lime	4.97
	100.00

Nitrogen 9.31 per cent.—equal to ammonia 11.29.

Here are three specimens before the meeting. Their intrinsic value, according to the scale before alluded to, is as follows:—

	£	s.	d.
Of No. 1.	9	12	9
Of No. 2.	9	2	6
Of No. 3.	9	7	7

or a mean of £9 7 7 ℔ ton, derived principally from ammonia, the mean yield of which, in the three specimens, is £7 11 4 ℔ ton.

The manufacture of this guano, on a large scale, will be carried on by a process of the following nature:—A given weight of fishy matter is placed in a large tank, and sulphuric acid of commerce added to the mass. This

may be called the digestive process, for the action of the acid is so powerful as speedily to reduce the organic matter to a soft pulpy consistency, resembling in appearance the fæcal matter of the birds. This pasty mass being placed in a centrifugal drying machine, and the superabundant moisture forcibly driven off, the partially dry matter is now submitted to a heat not exceeding 212° Fahrenheit, supplied by warm air or steam, and afterwards pulverized in a suitable manner. In this process, the oily matter of the fish separates itself, and swims upon the surface of the liquid, hence it can be easily separated, and forms an important item in the economy of the manufacture; since, taking all kinds of fishy matter, we obtain an average of 3 per cent. of oil, worth £25 per ton, or, as will appear hereafter, three-fourths of the whole expense of the raw material.

Another process might in some cases be adopted with advantage, especially with cartilaginous fish, such as skate and dog-fish, namely, by submitting a given weight at once to the drying process by warm air or steam heat, and then moistening with dilute sulphuric acid, which, in this case, acts simply as an antiseptic. But this process is rather more expensive, and is therefore only useful with cartilaginous matter, on which it is found, by experience, that acid hardly acts.

There is another form of fishery manure, and a most interesting one, reference being had to the manufacture in Ireland. The specimen No. 5, is a mixture of fish reduced to pulp by acid, and dried by the admixture of peat charcoal. In this form all the nitrogenous liquids, spun out by the former process, are retained, and there is full half in bulk of a very pure form of carbon. "Powdered charcoal," says Liebig, "surpasses all other substances in the power which it possesses of condensing ammonia. Within its pores it absorbs ninety times its volume of ammoniacal gas, which may again be separated by simply moistening it with water. It is not only a slow and constant source of carbonic acid, but it is also a means whereby the necessary nitrogen is conveyed to the plants." Now, carbonic acid may be termed the breath of plants, and they inspire it as animals expire it. By the processes of decomposition and recomposition, the carbon of charcoal arrives at the form of the fat of a prize beast; hence, in like manner as ammoniacal manures are suitable for wheat, the staff of man's life, so are manures like this, rich in carbon and phosphate of lime, the element of bone, are the most valuable of stimulants for green crops, the staple food of our beasts. The simplicity of the preparation of this manure should enable it to be sold at a low cost; and the preparation of the charcoal makes another branch of industry which might receive fresh impulse from the carrying out of Mr. Pettitt's scheme.

Now, as to the supply of the raw material. Attention was, of course, turned to this at an early stage of the affair. Information was collected at the outports on the British and Irish coasts, and from persons resident in or well acquainted with our Colonies; and much information was collected from the voluminous report of H. M. Commissioners of Irish Fisheries, and the report of Mr. J. D. Andrews, "On the Resources of our North American Colonies." prepared by order of the Congress of the United States, in 1851.

The sum total of the evidence collated from the parliamentary report of 450 pages, from the reports of boat-owners, of fishermen, of visitors, of persons specially charged to investigate these points, and of others who are at the present time actually engaged in Mr. Pettitt's manufacture, must be given very shortly, as the time allowed for this paper does not permit the reading of a great number of documents which had been prepared.

It appears, then, that the whole of our sea-board swarms with fish.

That seals, whales, and sunfish are to be taken on the coasts of Scotland and Ireland, in astonishing numbers; and are now useless except for their livers and skins.

That many thousand barrels of the waste of the fisheries (the most nitrogenous parts) are annually thrown away at the curing stations, and that in Devon and Cornwall thousands of tons of pilchards would be taken principally for their oil, were the oil makers and boat owners only secure of a nominal price for the crushed refuse.

That, from the wonderful reproductiveness of fish, it is practically impossible to exhaust the British much less the Irish Atlantic waters.

That the trawl-boats throw overboard dead fish to the weight of 1½ to 2 tons for each ton nyw brought to shore.

That fishing solely *for manure* is carried on to a great extent round the Channel and eastern shores of England, and that in no case which has come under notice does the price of such manuring fish come up to 30s. or even 25s. a ton.

That the price of fish is found to be occasionally as low as 2s. 6d. per boat-load, and that over 100 tons of sprats, bought at 10s. a ton, are now under treatment and being made into manure.

And lastly, which must not be lost sight of, that for every sort of eatable fish, there is another which prejudice or good taste has allowed to range the seas in large shoals, uncared for and hitherto unmolested, and these also are equally applicable with sprats and pilchards to the purposes of the guano maker.

It appears from Mr. Andrews' report to the American Congress that the Great Bank Fishery of Newfoundland, which formerly employed 400 sail of square-rigged vessels and 25,000 men, is now entirely deserted, owing to the withdrawal of bounties. It is a submarine elevation, 600 miles long and 200 broad, covered with cod fish, of which 10 or 12 men can take 50 tons in a short season, yielding four tons of oil. He gives the exports in fish of the British Colonies as under:—

From Newfoundland,	in 1850,	Cwt.	949,169	
„ Cape Breton,	in 1848,	„	41,364	
„ Nova Scotia,	in 1851,	„	196,434	
„ Canada,	in 1851,	„	224,000	
„ New Brunswick,	in 1850,	lb.	263.500	dols. worth
„ Labrador,	in 1851,	„	1,000,000	„

It may be imagined what a vast quantity of valuable manure might be made from the mere refuse of the curing establishments at work to procure the above vast total of *dried cod fish only*, seeing that fully one-third of the gross weight is thrown into the sea as the waste of the manufacture(a). This was stated by a member of the Council of Newfoundland to be in some places an absolute nuisance to the community of that island, from the formation of banks of refuse matter on the shores. Although the demand for dry salt fish is not very likely to increase more than *pari passu* with the Roman Catholic population of the world, it may well be imagined that. were a new market opened, we might hear of the Great Bank of Newfoundland being again covered with the cloud of shipping which was withdrawn after the year 1814. Another extract from the writings of Professor Way will conclude this division of the subject. He says, very briefly, "Fish may be taken as the type of animal, wheat of vegetable life; and there can be no doubt of their mutual convertibility when placed in the proper circumstances. I have dwelt upon this point in order to show how very valuable a source of manure, and consequently of food, we have in the waters that surround our shores, if we could work out the problem as one of economy. Practically, we do so this day by bringing guano, which is digested fish, from foreign parts."

In the third place we have to consider the cost of this manufacture, or, to use the expression just quoted, "how to work out the problem as one of economy." Estimates are, as is well known, most treacherous ground, and in those which here follow it must be borne in mind that, from the well-known variation in the prices of fuel and

(a) It will also be remembered that the annual take of seals from these colonies is one million, of which the blubber, skin, and hair only are now made objects of merchandise.

materials, in cost of transit, and in rates of wages, there is no pretence of anything beyond a fair approximation. The cost of fish is arrived at from due consideration of the two methods of obtaining it, which are,—1st, Fishing for it in your own boats; or, 2nd, Purchasing it by contract. The first of these plans is open to objection *prima facie*, as having an appearance of centralization; and it has, moreover, been always found that Associated Fishery Companies have met with ill success. Still, however, whole fishing communities *have* been found willing to exchange their uncertain gains for regular pay. The second method has been also hailed as a boon in numerous places on the coast, where the ideas of the fishery population have been sought for on the subject. Those unacquainted with the subject, will scarcely credit that the fish which appears at Billingsgate at 6d. to 1s. ℔ lb., hardly fetches more on the Yorkshire coast than £1 10s. to £2 10s. per ton, and very often less; and that thousands of tons of coarse, common, waste, and broken fish are annually taken round our shores for manure only, and delivered into farmers' carts at from 8s. to 10s. a ton. We may safely count on a great quantity of fish, either taken by the fleet of an Association or bought by contract, at a cost all round of £1 ℔ ton.

Taking 60 tons weekly, at 20s., the raw fish will thus come to, annually		£3,120
6 ℔ Cent. of sulphuric acid at £7 ℔ ton .		672
Labour, of all sorts, 15s. ℔ ton		2,340
Fuel, 5s. ℔ ton		780
Sacks for 1653 tons guano, @ 7s. ℔ ton .		578
Agency for sale of same, @ £1 ℔ ton .		1,653
Interest, wear and tear, and minor charges .		1,500
TOTAL EXPENDITURE . .		£10,643
Sales.		
3 per cent. of oil on 3,120 tons of fish, or 93 tons sold at £25 per ton	£2,325	
1653 tons of guano, at £7 per ton	11,571	13,896
Profit . . .		£3,253

On a floating capital of £4,000 at most, and a fixed capital in plant and machinery of £1,000.

In this estimate advantage has been taken of the profits from the fish oil, to reduce the price of the manure to 7*l*., while its intrinsic value, as previously shown, is 9*l*. 7s. 7d. per ton. Were the whole of the charges incidental to the manufacture to be thrown upon the guano, it appears that its production would cost 4*l*. 18s. per ton, and that it should realise 7*l*. at least; and this is the answer to the third question.

The fourth query, it will be remembered, was whether a sale would be found for the manure when made. It is almost superfluous to enter upon an argument which can after all only arrive at a probability; but the reason why a strong probability exists will be touched upon, simply to obviate a possible objection that this point has not been considered. It is assumed that there is a very great necessity and ready market for *some* manure, and that the fisheries guano *can* be sold at the price before stated. It remains to be seen whether it has the qualities of a saleable article.

The great features of the science of agricultural chemistry applied to manures are set forth in a few words of the celebrated Liebig, who says—"Carbonic acid, water, and ammonia contain the elements necessary for the support of animals and vegetables; the same substances are the ultimate products of the chemical processes of decay and putrefaction. All the innumerable products of vitality resume after death the original form from which they sprung, and thus death, the complete dissolution of an existing generation, becomes the source of a new one."

The most indispensable organic element of man is nitrogen, and it is as indispensable to the plants on which he lives. The means whereby the vegetable world appropriates its normal proportion are so mysterious that it would be superfluous here to speculate upon them; but this *is* a demonstrated fact, that if we would give an extra stimulus to the nitrogenous yield of the earth we must pour into her storehouses fresh supplies of nitrogen or *food for plants*, and that in its most assimilable form. This form is ammonia, and the guano of Peru has been appreciated as the most highly concentrated source of ammonia, fulfilling also other conditions of chemical and commercial importance in a good and perfect manure. This reasoning has also since the rapid spread of the knowledge of agricultural chemistry, practically governed in their transactions both the judicious buyer and the honest dealer in manures. Hence *any* nitrogenous preparation can take a position in the market according to its value as apparent on chemical analysis, subject only to a discount, so to speak, for the probabilities of prejudice, doubt, and want of practice; and hence the demand for the new guano in large quantities which *has* actually arisen before a ton of it was made, or any publicity given to the idea. This division of the subject demands no further illustration. As logical proof is out of the question, and we have but presumption from analogy as our terminus, the answer to the fourth query, (which after all is mainly involved in those to the first and third), may here rest.

There remains for the consideration of this Society one point which should by no means be foreign to its objects. These are the possible national and social advantages of the scheme. The depressed condition of much of the fishing population of Ireland, and many parts of Scotland, have been too long and too often before the public to need detail here. It was possible that the alleged distress might be only the vain cry of interested greivance-mongers, and such, strange to say, have invariably met this proposition for amelioration with a simple denial of its possibility.

Steps, therefore, were taken to search for facts, and it is a fact that there is an inconceivable amount of wretchedness to be relieved, and the prosecution of this scheme might aid it *to relieve itself*, which we all know is the truest and best of charity. Since the withdrawal of the fishery bounties for the last time in 1827, which had in five years doubled the number of men employed, the fisheries of the west have again receded to their old level. The Crown commissioners have most honourably and sagaciously administered, since the commencement of the present century, more than 250,000*l*. in the relief of the Irish fisheries alone, but with comparatively little result. It was vain that piers were built, harbours deepened, and loans in boats and nets made to the fisherman. For a time he caught the fish, but who was to buy it? The state could not give the Irish population money to buy what they had paid the fisherman to catch. The fisheries have therefore obstinately declined, in face of state encouragement and of chartered companies, which had for their object the providing vast quantities of edible fish for the great markets. But if we demand of the fisherman ten, twenty, or one hundred tons of marine matter of all sorts and conditions, instead of his customary selection; if, in fact, we nail over the factories the homely old proverb—"All is fish that comes to our net," we surely must and shall drag forth more labour, and fully employ all who at present wretchedly divide their time between sea and land; and, half-farmer, half-sailor, are comparatively cripples in either vocation. As a nation, we are thankful that the sea-faring life has always been most alluring to the natives of these islands. Those who pursue their business on the waters, are fain to continue their calling in spite of grinding poverty in every form. The heart of many an observing traveller has been moved at the sight of the wretched man, the crazy ill-found shallop, and the ruinous hut, that compose, so to say, an Irish or Hebri-

dean fisherman and his stock, and at the reflection that this should be the raw material of the British sailor.

The fisheries have always, with the sea-borne coal trade, been esteemed the nurseries of our national navy; and we have now more than a little difficulty in manning our fleets, to speak in the most reserved manner; and that difficulty will not diminish with an increase in the number of ships of war, unless, indeed, there were at the same time a vast and lamentable reduction in the commercial shipping of the country. This very commercial marine is now inadequate to the work of the traders. More ships and more men are wanted for commerce; more ships and more men are called for to protect British rights and serve British interests in every quarter of the globe. It cannot surely then be out of place to suggest that a plan which, having borne investigation, in a commercial and scientific point of view, shall offer even a symptom of benefit to the nurseries of our sailors, becomes of almost national importance and worthy of public consideration.(a)

The second paper read was—

ON FISH MANURE AS A SUBSTITUTE FOR GUANO.

By J. B. Lawes.

Some years ago, a gentleman, who possesses a large property in Newfoundland, and who carries on an extensive business in salting cod-fish, requested me to make some experiments, with a view to converting the unsaleable fish and cod-fish offal into a manure, and also to ascertain whether the dried cod fish would be valuable as a food for animals. An account of some of the trials of the dried fish itself as food for animals, is now in print, and will shortly appear in the "Journal of the Royal Agricultural Society of England." To explain, however, the conclusions arrived at in reference to the use of the offal fish and refuse as manure, the following short statement of the process employed in curing the fish for food may be given:—Platforms project out into the sea, upon which stand the men who cure the fish. The fish are handed up from the boats, and the curers split them down with a knife, take out the back-bone and the offal and throw it into the sea; and, having sprinkled some salt over the fish, it is removed and dried in the sun. The quantity of offal thus thrown away amounts to some hundred thousand tons.

The question was not whether such matter, when properly prepared, would be a good manure—for of this there could be no doubt—but it was, whether a manure could be prepared which would, in point of composition, supply certain constituents at a *cheaper rate* than guano and other manures already in the market.

Looking at the question in this point of view, the inquiry showed that there were difficulties in the way of attaining such a result, which were sufficient at the time to lead to an abandonment of the idea of converting this refuse into a marketable manure. Thus, the fishing season is confined to a short period during summer, and time and labour are then so valuable, that every man, woman, and child is employed in some process connected with the preparation of the cod as food. Indeed, so important is it that the population should not be occupied with other pursuits, that the cultivation of the land is neglected; and the proprietors of the fisheries supply the people with food and other necessaries imported from other countries. Under these circumstances, it was evident that, in order to convert the offal into manure, one of two things must take place: either part of those already employed in catching or curing fish for food, must leave that occupation for the other, or a large number of people must be brought from elsewhere, and be maintained by the proprietor for the sole purpose of making manure. With regard to the first of these alternatives, it is clear that, so long as a ton of dried fish would sell for much more than a ton of the manure, it could not be to the advantage of the proprietor to change the occupation of the people; for the cost of the fish itself, apart from that of the labour employed in preparing it, would be comparatively small, whilst that of the latter would be nearly as great to convert a ton of offal into manure as a ton of the codfish into food. On the other hand, to maintain a larger number of people on the island for the purpose of converting the offal fish and refuse into manure, seemed not likely to be profitable, unless the manure were to sell for a higher price than its composition and the relative value of other manures in the market would justify. Under these circumstances, it appeared to me that unless the offal-fish and offal could have been kept until the busy season was over, and then worked up for manure, it would not be profitable to engage in the manufacture; and as this even involved some immediate expenditure of labour, and as such matters enter very rapidly into putrefaction, I could not see that the undertaking of converting the Newfoundland offal-fish and offal into a portable manure for competition with others in the market was practicable.

With regard to the more special subject, Mr. Pettitt's Fisheries Guano—I see, that a discussion has taken place on this subject before the Royal Dublin Society; from the report of which I think we may gather that large quantities of offal fish and fish offal, which at present are thrown into the sea, would be brought to shore, provided they could be sold on the spot at a price of from 30s. to 2*l.* per ton. I also gather from the same paper, that Mr. Pettitt's process consists in mixing sulphuric acid with the fish-material, and drying it. It certainly appears to me, that a fish manure, prepared by such a process, although undoubtedly an excellent manure, is nevertheless widely different from *guano*, both as to the constituents which it supplies and to the state of combination of those constituents. In guano we find large quantities of phosphate of lime (in a state of comminution in which it is more readily available than in most other manures), whilst, judging from the analysis by Professor Way, the product of Mr. Pettitt's process contains only a very small quantity of phosphate of lime. In guano, again, the whole of the nitrogen, or nearly so, exists, either in the form of ammonia or of other very readily active nitrogenous compounds, the products of the perfect chemical destruction in their passage through the body of an animal, of those more stable nitrogenous compounds of which the bodies of the fish so largely consist. In the product of Mr. Pettitt's process, however, I presume there can be but little of the salts of ammonia or the other compounds resulting from the digestion, assimilation, and retransformation of the substance of the fish when it has been used as food. In fact, the proposed fish manure is *dried animal matter*, with but little chemical alteration; in which, therefore, a large proportion of the nitrogen will still exist in its original state of combination. However valuable, therefore, such a substance may be as a manure, it can certainly with no propriety be called a *guano*. The chemical effect of the sulphuric acid on the animal matter, and its utility in the process, are, indeed, not very obvious. It would probably serve, on the one hand, somewhat as an antiseptic; and on the other, to retain the small quantity of ammonia which might still be formed.

Again, the sample of fish-manure analysed by Professor Way contained only about 5 per cent. of water. But as the quantity of water in fresh fish is not much less than

(a) Since the foregoing paper was written, a singular confirmation of the author's views as to the supplies of Peruvian guano, has been made public in the Report of Admiral Moresby, of the Pacific station, to the Board of Admiralty in England. It appears that the gallant officer, accompanied by the Goverment Commissioners of Peru, and the resident agent of Messrs. Gibbs and Co., landed on the island, and took plan, section and elevation of the deposits. His deliberate conclusion and official report was to the effect that, "at the present average rate of exportation, the islands would be exhausted of the guano that would pay freight, or be saleable in the English market, in eight or nine years."

8.0 per cent, it is obvious that it would take from four to five tons of fresh fish to produce one ton of the manure in the condition of dryness as stated. If, therefore, we take the most favorable estimate which the statements at present made seem to justify, namely, that one ton of fish, or its offal, could be delivered on shore for 30s., it would then appear that from 6*l.* to 7*l.* must be paid for the raw material only at the place of landing of one ton of manure: to which must be added the cost of sulphuric acid, of the drying, of labour of boys, transports, &c.

For these reasons, I think it will be very difficult to produce a manure of the kind in question which can be sold to the farmer at much less than the present price of Peruvian guano. It would seem indeed, from calculation, that unless offal fish and fish-offal could be obtained at an almost nominal price, it would at present be almost impossible to establish a manufacture which could so compete with the manures now in the market as to hold out a prospect of success both to the producer and the consumer. And how far also a decline in the present supplies of natural guano, as well as a much reduced estimate of the cost of the fresh fish and offal might affect the result, is of course a further question.

DISCUSSION.

Mr. Horace Green said that though the paper of Mr. Lawes was very valuable, it must not be forgotten that that gentleman was himself a large manufacturer of guano. He did not like the introduction of phosphate of lime, as he himself dealt largely in that article. The guano now brought before them, however, did not contain so much of phosphate as of ammoniacal properties, which were best for the staff of man's life—wheat; while the guano of Mr. Lawes was best for turnips and green crops—the food of beasts.

Mr. Mechi came from rather a fish country—Essex—where it had long been the practice to manure the land with fish, and it was the conviction of the farmers in that district that within a certain distance of the coast—say eight or ten miles,—the sale of fish would successfully compete with guano. The smell of the fish applied to the land in the hundreds of Essex was very great, and no doubt it lost a great portion of its power by the escape of the ammonia, which would be probably set in it if prepared with sulphuric acid. The farmers ploughed it into the ground as quickly as possible, as it might otherwise be smelt for a mile or two, and large quantities were carried off by the gulls. There could be no doubt that fish manure was good for root crops. The star-fish, or five-fingers, fetched 6d. a bushel, and sprats 8d., excepting in very cold weather, when the latter article rose in price in consequence of the quantities sent up to the London market. That might, however, be considered the average price, which would give them 1s. 6d. per cwt. or 30s. a ton. Large vessels were employed at Holbury and other places to catch fish for agricultural purposes. Mussels were also extensively used in their shells, their cost being about 20s. per ton. The guano at 30s. per ton would no doubt be valuable, but how far its being dried and cured, so as to obtain the oil, would enable it to be sold at that price, of course he could not give an opinion. If they could fix the ammonia by the use of sulphuric acid, it would of course add to the value of the manure.

Professor John Wilson, during the reading of the first paper, noticed two or three inaccuracies, which he would have corrected but for the paper of Mr. Lawes just read, with which he fully agreed in every particular. If the matter were tested further, he had great reason to believe the cost of Mr. Pettitt's guano would be found to be underrated.

In reply to a question from Mr. Mechi,—

Mr. Green said it was impossible to give an opinion on the cost of dessicating the fish, as it must depend on a variety of circumstances—such as the quantity to be operated on, the position of the machinery, &c.

Mr. J. C. Nesbit wished to notice one or two errors which appeared in the first paper read. In the first place, referring to the supply of guano, he might observe there had been an increasing sale each year, though the papers of the House of Commons did not enable them to decide on the exact quantities imported. He believed the reason why there was nearly a deficiency last year arose from the desertion of the sailors from the vessels in Australia which were under engagements to call for the guano on their voyage home. He had always looked upon fish manure of great importance, and some years ago he tried some experiments by which he found he could obtain a large quantity of oil and valuable manure from fish. He recommended it to Mr. Fisher Hobbs and other well-known agriculturalists, and told them the supply of guano would not last more than a few years, whilst there was plenty of fish round their own shores. Mr. Lawes' objection to the use of the fish guano appeared to be that it would not digest chemically, and that when dried, it would not act so well on the ground. Now there had been large importations of late of a peculiar manure from South America; it was the dried flesh of animals killed at Buenos Ayres principally for their hides. The best parts of the flesh were selected for food, and the rest boiled down for the fat; after which it was dried and sent to this country for manure. This flesh manure, though highly dried, was found to act well for wheat, and he had no doubt that dried fish would also act and give forth the ammoniacal and other properties required for the food of plants. The amount of artificial manure used in this kingdom was 5,000,000 or 6,000,000 tons a-year; and he believed, until that amount got up to 50,000,000 or 60,000,000, there would be no limit to the demand. He thought that if the fish guano could be obtained at a reasonable price, it would be productive of great results. Of the dried flesh, only about 9 per cent. was ammonia; but it had been proved to be very good for wheat. The manure was sold at about 6*l.* per ton. Thousands of tons of it had been used, but the supply had been interrupted owing to the disturbances in Buenos Ayres.

Mr. Dugald Campbell had only had his attention turned to the matter a day or two since, when he obtained a copy of the specification of Mr. Pettitt's patent to ascertain its objects. On turning it over he found that one part of it provided for the decomposition of animals as well as fish—a matter highly important in a commercial and chemical point of view. Some years ago Mr. Turnbull, of Glasgow, the proprietor of Turnbull's blue, produced in his manufactory a large quantity of muriatic acid, which he did not know what to do with. Being of an ingenious mind, and mixing a great deal with farmers, he took to buying up dead horses, and boiling them in the acid to a pulp, which was then converted into dry flesh manure, for which it was sold. He had seen specimens of it, and found it contained a large proportion of muriate and sulphate of ammonia. If the agricultural magazines of Scotland were attentively searched for a few years back, he had no doubt an account of the manufacture would be found. He did not know whether Mr. Turnbull had applied his process to fish as well as animals, but the idea of preparing manure from the flesh of animals by sulphuric and muriatic acids was certainly not new.

Mr. Mechi might observe that Mr. Hudson, of Castleacre, having a few years since lost a large quantity of sheep, which he had imported, by small pox, he had them decomposed into manure for turnips, and met with great success. In reply to a question from Mr. Longmead, Mr. Mechi said that all the animal refuse of his farm, as well as dead animals, were thrown into his tank for decomposition; and he, therefore, had no doubt that his liquid manure contained a large quantity of carbon in solution.

Mr. James Caird did not wish to enter into the merits of the fish manure, but would address himself to the practical part of the question, viz.: Could a sufficient quantity of fish be obtained at a price to make the manufacture of the guano profitable? Mr. Lawes said that fish contained 80 per cent. of water, and only about 5 per cent. of

guano and 15 per cent. of other products. Mr. Green, on the contrary, said it only contained 40 per cent. of water. If Mr. Lawes was right the expenses would be at once doubled.

Mr. GREEN could not say that Mr. Lawes had not produced 80 per cent. of water out of fish; but their experiments left them 40 per cent. of available products.

Mr. PETTITT might observe, in answer to Mr. Lawes' statement, that the fish only gave 20 per cent. of solid product; that he held a specimen in his hand in which there was 16·80 per cent. of bone or phosphate of lime. He believed that on an average he should get 30 tons of oil and manure to the 100, and five tons of phosphate of lime. Supposing, however, that a ton of guano could be produced from four tons of fish, that would give them 9*l.* per ton, at a cost of 4*l.* for the raw material, as all kinds of fish, including turbot, cod, &c. could be obtained on the Yorkshire coast at 1*l.* a ton.

Mr. MECHI said 100 tons at 30s. would amount to 150*l.*, and if it produced 30 tons of guano, that would give 270*l*; and the question was, would that remunerate the manufacturer?

Mr. CAIRD thought that the raw material could not be obtained at 1*l.* a ton; and if there was a larger demand than at present it would enhance the price.

Mr. BIRD agreed with Mr. Caird with regard to the supply. He did not think it would pay, as a commercial operation, to erect large machinery and trust to a doubtful supply from the neighbourhood to keep it at work.

Mr. PETTITT stated, in reply to a question from Mr Mechi, that he would shortly be ready to supply the artificial fish guano, certainly by next spring. In reference to what had been stated by Mr. Campbell, that Turnbull, of Glasgow, was the originator of this guano, he having, years ago, boiled up dead horses in muriatic acid, and sold the produce as manure, he might observe that the real nature of Turnbull's manufacture was the production of the cyanides from the nitrogen contained in the animal matter, for the manufacture of his celebrated blue, the residuum only being sold for manure. This residuum would be totally devoid of ammonia, and would, in fact, only be a mixture of the phosphate of lime (from the bones of the animal) and inert organic matter, or animal carbon. This being the fact, no claim could be maintained to the discovery of fish, or even animal guano, of any kind, by Mr. Turnbull, indeed, there was no analogy between the two manufactures. As regarded the question of supply, if the present fisheries were carried on at a profit, solely for the taking of select eatable fish (and it might be safely assumed that there was a profit, or they would be discontinued), how much more successful must this scheme be, combining the profits of the present system with the large profits of the proposed guano manufacture, from animal matter of all kinds, drawn without *extra* labour from the teeming waters. To suppose a deficiency of supply, was almost to doubt the existence of all kinds of fish, from the monstrous whale to the humble sprat: and to doubt the taking of these fish, was to set the vast machinery and activity of our fishery population, aided by the practical bounty of at least 2*l.* a ton, now paid as freight, in the balance against a flock of Peruvian geese.

Mr. NESBIT understood that four-fifths of the fish caught was returned to the sea as useless, and the question was whether this could not be bought up. A company had been projected to obtain, by means of steam and screw vessels, good fish for the London market, and probably Mr. Pettitt might be enabled to arrange with them for the refuse fish. It was to the refuse fish now thrown away that the great supply must be looked for.

Mr. CAIRD considered the whole of Mr. Pettitt's calculation to be based on the cost of refuse fish.

Mr. GREEN denied that it was so; it was based on the calculation of fishing or contracting for fish of all kinds, and they might perhaps send the best to market themselves. When a deputation recently waited on the Earl of Clarendon with reference to the fisheries, he referred them to the coast of Newfoundland, and the report of the Committee of the House of Commons showed that plenty of seals and fish might be had on the north coast of Ireland. Mr. Green then proceeded to read extracts from a number of letters, to prove that an ample supply of fish might be obtained at moderate prices.

The CHAIRMAN said that by the rules of their Society, and very properly, no decision was ever come to on the value of the papers laid before them. There could be no doubt that the subject of utilising refuse materials of all kinds, and the more especially of fish, as it would not only produce them good manure, but add to the food of the people, was one of the greatest importance. Large quantities of fish were now thrown away which might be converted into manure, and the practical question was whether it would commercially pay. At all events, they must feel obliged to Mr. Green for his valuable paper, and he was sure the Society would have great pleasure in giving him a most cordial vote of thanks. They would not be doingj ustice to Mr. Lawes, who, he regretted, was not present, if they did not also include that gentleman in the vote.

The votes of thanks having been passed,—

The Secretary announced that, on Wednesday evening next, there would be a *Soiree*, when the Exhibition of recent specimens of Chromo-Lithography and Colour Printing, including those from Vienna, would be opened.

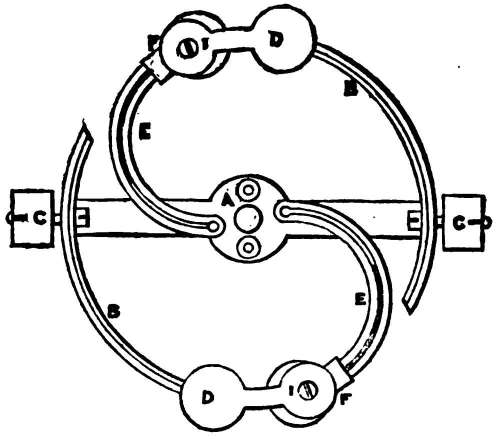
ON RECENT IMPROVEMENTS IN CHRONOMETERS.

BY E. T. LOSEBY.

(*Concluded from page* 59.)

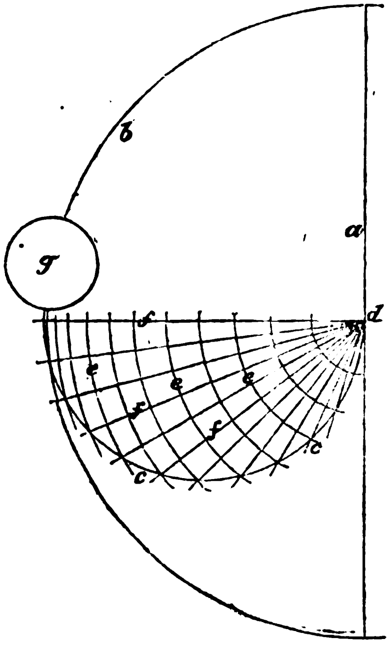
Having now given my own views respecting the impossibility of producing a compensation by any arrangement of the compound laminæ, the experience of some others may be added. In 1843, the present Astronomer Royal, Mr. Airy, first directing my attention to the smallness of the motion available, informed me that some years before he had tried a great number of arrangements, by calculation, amounting to probably fifty different forms, without being able to find any that would succeed. Mr. Charles Frodsham has also informed me that the late Mr. Arnold left a great variety of shapes that had been tried with no better success; whilst the time that has been altogether expended by men of lesser note has been enormous, for there is scarcely a person practically connected with chronometers whose attention has not been occupied by the subject. And it must be remembered that, unlike experiments in most other arts, months are often required for the completion of a single trial. The majority of these have expended their time on plans similar to Mr. Eiffe's, and but few appear to have been acquainted with the shortness of the motion they had to employ, whilst some persons, not content with mechanical action at one point, have introduced several levers with a view of magnifying the motion; as though the freedom necessary in the pivots, and the friction of their action, were of no more consequence than they would be in ordinary machinery. The last method that remains to be noticed, is the one introduced and patented by myself, which is represented at Fig. 5 (see next page), where it will be observed that mercury is employed to effect the supplemental compensation. In this figure, A is the bar of the balance, B B is the ordinary compound rim, C C are time-ing screws, and D D are weights for adjusting the primary compensation; E E are the secondary compensation tubes containing mercury; F F and G G are fittings for attaching the tubes to the balance, and I I are screws connecting the parts F and G. These also admit of the tubes being turned in or out, to alter their inclination to the radii of the balance in adjusting the secondary compensation. The primary compensation being effected in the usual manner, it only remains to

Fig. 5.



explain the action of the secondary, which will be understood by a reference to the diagram, Fig. 6, where the

Fig. 6.



line *a* represents the diameter of the balance, and *b* its circumference, *c* the curve of the tube, tending from the bulb *g* to the centre of the balance *d; e e* are circles concentric with the centre *d*, and divide the line representing the tube into equal parts, corresponding to the position of the mercury in equal increments of temperature, as 10, 20, 30, &c.; *f f* are lines radiating from the centre, showing the different inclinations of each division of the tube to the radii of the balance. The progressional increase of motion in the column towards the centre, and consequently its effect on the momentum of inertia of the balance, is shown on the radius nearest the bulb, where it is crossed by the segments *e e*. There are also various modifications to suit the different requirements of box and pocket chronometers. The principle and action of this balance having been described, it will now be tested by the conditions already applied to the other methods. The first condition is fulfilled, as shown in Fig. 6, by substituting a fluid agent for a solid one, which admits of the motion produced by its expansion being increased to any amount, by adopting the method employed in thermometers, of making the tube along which the mercury ranges smaller than the reservoir, and sufficient motion being thus obtained, the fluidity of the agent admits of its being directed to or from the centre of the balance at any rate that may be required. The curve and position of the tube necessary to give the proper progression were determined by experiment, and no alteration has been made in this respect in any of my chronometers that have been tried at the Royal Observatory, Greenwich, during the last six years. With reference to the second condition, the supplemental tubes are made in the following manner. The tube as first drawn is sorted according to the size of the bore, by causing a thread of mercury, measured on a scale, to pass along it, and afterwards noting the weight in a balance (weighing) sensible to the thousandth of a grain; the bulb is then blown to fit a gauge, and the capacity measured by filling it with mercury, and weighing the contents; the tube is next bent to the proper curve, and after being again filled with mercury, the range is measured by an instrument contrived for the purpose, capable of showing the expansion with great accuracy, after which, the tube is sealed up, with a small portion of air included; a small reservoir having been formed at each end of the tube, the one to contain the superfluous mercury, should it get accidentally over heated, the other to prevent the mercury receding into the bulb however excessive the cold. The tubes are subsequently weighed with the mercury included, the range measured a second time, and all the items entered on lables attached. The weight and size of the balance being given, the proper tubes can therefore be selected at once; and by this method it is found in practice that the secondary compensation can always be adjusted to within five-tenths of a second a day throughout the whole range from 10° to 110° Fahrenheit. The adjustment by actual trial is consequently confined to the primary compensation which fulfils the second condition. The third condition, which requires that the auxiliary, when once adjusted, should remain permanent and not liable to derangement, is answered by the mercury being contained in glass tubes hermetically sealed, as no change of expansion can take place any more than in ordinary thermometers; whilst the portion of air left in the tube, together with the capillary fineness of the bore, effectually prevent any motion of the mercury from accidental causes. And as the secondary compensation does not depend on any mechanical action between it and the primary, the fourth condition is complied with.

Before quitting the subject it may be observed that this is not the first instance in which it has been attempted to employ mercury in the balance, as will be seen from an examination of Le Roy's plans, invented in France during the last century. Le Roy's object was not, however, to provide for the supplemental error, but to employ mercury in the balance as the primary compensation, by simple expansion direct to the centre, after the manner Graham had so successfully employed it in the pendulum, but as the correction required in the balance was many times greater than that required for the pendulum, its application as a primary compensation consequently failed. In his later plans, Le Roy appears to have assisted the mercury by the greater expansion of alcohol, but without success; and had the expansion been sufficient to effect the primary compensation, the secondary would have remained uncorrected to a somewhat greater amount in this arrangement than in the ordinary balance, which has been shown to require a further addition of 1-46th of the entire compensation in the progression marked on the diagram, Fig. 1, page 57.

N.B.—Errata in last part of paper. Page 58, col. 1, line 16, for *the effect*, read *no effect*. Page 58, col. 2, lines 14 and 15, for *banking instead*, read *banking. Instead.* Page 59, col. 1, line 3, for *A and B*, read *B and C.* Col. 2, line 1, for binding, read bending; line 11, for *eight seconds*, read *eight-tenths of a second*.

COTTON FROM THE RIVER PLATE.

Mr. G. W. Drabble, writing from Buenos Ayres, under date October 1st, to Mr. J. A. Turner, President of the Manchester Commercial Association says: "I would observe that much more attention is being attached to the country of Paraguay, as a rich field of enterprise, and as a pioneer to what we hope may be continued efforts. A steamer started from this port yesterday to that destination, conveying a Company recently arrived from the United States, said to be well supported, consisting of several directors, and conveying with them machines for the cultivation and cleaning of cotton, tobacco, sugar, and rice; saw mills, for the making available for export of the valuable wood that there abounds; and other machines, suitable for the development of its resources. If they are once enabled to establish a footing there, and especially if the project of steam navigation up our interior rivers is accomplished, great results may attend these primary efforts. Some of the interior provinces of this confederation have been long said to be most suitable for the cultivation of cotton; and a sample, pronounced to be of very fine quality, from one of them (Tucuman), was last year exhibited in Manchester. I have forwarded, per steamer, another sample from the neighbouring province of Catamarca, whose lands are reported as being capable of producing a much superior article to any other of those states. I consider, however, that a great difficulty will exist in the development of this cultivation in any of these interior provinces, from the long land carriage required to bring it to an exterior market. The cost of the best qualities there as plucked, say with seed, is 7 to 8 reals per arroba, if cleaned up there, as must be to give the least hope of successful competition, it is calculated that the yield would give about 25 per cent of gross, thus placing the cost of an arroba or 25lb. at an average of 30 reals; expenses of cleaning would be 2 reals; carriage to Buenos Ayres, per arroba, 6 reals: total, 38 reals; which, taken at to-day's rate of exchange, would net per lb., 8 1-5d. In Catamarca the cotton tree has been cultivated regularly, but attention never having been paid to it as an article of export, the production has never increased. It is a perennial plant, sown in spring and yielding the same year. It grows about 4ft. to 5ft. high. In the winter it is cut down, but the following spring it shoots up for another year's yield. No great care is paid to it till the time of gathering the pod, when it is regularly plucked. The Paraguay and Corrientes plants are of the same class, the quality of the Corrientes cotton has so far been much inferior. It is, however, in the same latitude, and the soil is represented as being equally fertile, and from its geological position, that province would seem o be most preferable. The great drawback to the extension of this cultivation will be the want of labour: the population of Catamarca is not more than 40,000; that of Tucuman may be estimated at 50,000. But even so, there are so many other articles of production of great value, and requiring little labour, as tobacco, sugar, &c., that it will be difficult to obtain sufficient hands for the plucking and cleaning unless expressly imported. The requirements of the native population are few, and their ambition soon satisfied. It is, therefore, almost impossible to get them to labour for more than their actual wants. That these countries, however, present many facilities and advantages for the extension of this cultivation, cannot be doubted; and equally so that capital, properly laid out, would, with care and energy, give every prospect of ample profit." Several gentlemen, who have seen some samples sent from the River Plate, are of opinion that Mr. Drabble has under-estimated the proportion of clean cotton to be obtained from a given weight of that in the seed. They state that the proportion would be about 33 per cent., instead of about 25; and if this be so, a proportionate reduction must be made in Mr. Drabble's estimate for the cost.

Home Correspondence.

GOLD AND QUARTZ, THEIR SOURCES AND USES.

Sir,—Some one has said, with laconic brevity, "dirt is something out of its proper place." The remark is pregnant with wisdom. In many of our manufacturing operations large heaps of dirt accumulate. Gas-tar was long in the condition of dirt, till more advanced chemistry found a place for it. Scoriæ of the iron furnaces is only just found out to be a very useful glass, and slack at the mouth of coal pits is found to be a convertible fuel. So in the neighbourhood of gold and silver mines, rock-dirt is piled in heaps, waiting till utility be made, as the Easterns say to "eat dirt," and thus fatten wealth.

I have been led to these reflections by Professor Ansted's report of the results of Mr. Berdan's gold producing process. It seems clear that, so long as gold is considered wealth, the multiplication of it may go on increasing till it reaches that point when a greater value of wheat than of gold may be produced by a given quantity of labour. Apart from this, the time will come when, by the operation of two reasons, gold will be considered a much less desirable commodity. First, its value as a medium of exchange will lessen in proportion as the world becomes civilised. Education—not the tools of education—mere reading and writing, but education in the sense of mental and moral cultivation, will teach the present barbarians that paper promises are on the whole as trustworthy as cumbersome coin, and will make the immoral intellectual man more and more sensible that forgery and swindling will not pay. Secondly, the probability is that the yield of gold will be constantly on the increase. The hundred weight that has been found may be but the forerunner of many hundreds weight in similar modes.

Gold is always metallic, that is to say, is never found chemically combined with any other substance. If combined with other metals mechanically, the combustion of the other metals will leave the gold pure. Supposing therefore the globe to be in a state of internal fusion, the metallic gold would gravitate to the bottom of the furnace, just as iron in fusion sinks through the slag or glass which floats on the top, but which nevertheless contains small particles of iron. Quartz rock may be regarded as the slag of the gold furnace. The quartz would seem to have floated on the surface of the gold in a liquid state, with more or less of gold in it. The sudden opening of the crevices in the crust of the earth above it, and then as sudden closing, seems to have forced up the molten slag, and formed veins of it. While rising under the pressure, particles of gold have become entangled in it, varying from the size of blocks and nuggets to an impalpable powder. The larger pieces of the gold would be, as they are found, in matrices of the quartz; the smaller would be disseminated in the solid masses of slag, when cooled. Gold is so commonly found in quartz, that probably all contains some small portion, which would be found on careful examination.

The gold and quartz thus thrown up in mountain fissures by volcanic action, would by the subsequent rain and frost, be broken down in fragments, and washed by alluvial process into the beds of streams and over large districts, possibly while under water. The heaviest lumps would find the lowest level, and probably deep in the beds of the largest streams and rivers, amongst fragments of rock, will ultimately be found the largest masses of gold. In the quartz rock it is mostly disseminated in minute particles.(a)

(a) In various publications I have expressed my opinion founded on South American experience, that gold probably exists in as large quantities as what are called the common metals, but that it is deeper down. In a pamphlet published previous to the Californian discoveries, I had ventured to predict that

The process of gold assaying amongst the native miners of South America is very simple. A fragment of quartz is pounded, and rubbed to powder between two pieces of granite. A bullock's horn, of a black colour, is the only assay instrument. It is cut longitudinally into two equal pieces, partly on the curve, so that one half forms a kind of long spoon, the inside being polished. The powder being placed in the spoon, water is poured in it, and shaken, and then poured off. A second and a third water being applied, nothing is left but the coarser particles at the bottom, and at one edge of them, conspicuous on the black horn, is seen a fringe of gold powder, if gold be present. With a keg of water at his back, and his spoon in his wallet, and a little parched meal, the mine hunter wanders amongst the barren rocks in search of a treasure, which he sells when discovered, and seeks another; the claims of labour being practically regulated by natural aptitudes, just as the North American squatter sells his "betterments," and moves into another locality, not too "crowdy," with a neighbour only five miles off.

The man who buys the mine, digs the ore, breaks it up into the size of walnuts, loads it into hide sacks, borne on mules, and sells it to the *beneficiador*, or benefitter, in the valley below, who passes it through his mill. Considering the ways and means at his disposal, his mill is more of a marvel than Mr. Berdan's machine.

Having settled upon a small stream, with a fall of from four to five feet, he builds up two walls to enclose it on each side, and a back wall to form a small reservoir, with a spout and plug to let out the water at his pleasure. Over the side walls, with considerable labour, he contrives to lay a flat circular granite stone, some five feet in diameter, with a hole of fifteen inches through the middle. The middle of the stone is hooped round with staves, which stand up eighteen inches in the form of a tube. The outside is surrounded with similar staves, so that a water-tight circular trench is formed, with a granite bottom. Through the central hole is passed the straight stem of a tree, shod with an iron pivot, standing in an iron shoe, fast to a block below. The upper part of the tree is steadied in a beam above, supported by two upright posts. Through the middle of the vertical shaft is a horizontal hole, with a horizontal shaft projecting on each side. In this horizontal shaft, at nearly the level of the foot below, are affixed in a circle, like the spokes of a wheel, a number of wooden spoons, about three feet in length. To the horizontal arms above are tied, by raw hide cordage, a sort of large flag paving stones, with their faces bearing on the flat granite below. The water being turned on the spoons, the paving stones are drawn round by the motion of the shaft, and grind the quartz.

An improvement on this is to use two vertical rolling stones, eighteen inches thick and five feet in diameter, with a circular hole in the centre, through which the horizontal shaft or arm passes, and forces them round. As the stones vary in their speed on the inner and outer edges, there is a grinding as well as a crushing process.

When the machine is at work, a quantity of quicksilver is thrown into the trench, and the quartz with it. A small stream of water runs in, and at one portion of the rim there is a hole for it to run over, which it does, carrying the floating mud with it. As it runs over, it falls into a goat-skin, with quicksilver at the bottom. Out of this goat-skin it falls into a second, with more quicksilver, and so on from one to another, according to the amount of fall.

When the quicksilver is supposed to be saturated, the mill is stopped, the quicksilver is taken out of all the receptacles, and poured into a linen bag of fine texture, and three or four thicknesses. The quicksilver is squeezed through this bag, and the thickening amalgam is finally rammed down with a sort of rolling-pin.

In a pool of water is a large tile, standing an inch or two above the surface. On this tile is placed a piece of red-hot wrought or cast iron, an inch thick and six inches square. The amalgam is quickly dropped on the iron, and covered with a clay retort, enclosing the tile and standing in the water. A bent neck to the retort descends into a vessel of water, and the sublimed quicksilver leaving the gold pure, is finally collected from the water vessel in the metallic state. Occasionally the amalgamator is not too anxious to throw off the whole of the quicksilver. It might serve to a customer not too scrupulous.

I once asked one of these "benefitters," who happened to be a mine-owner as well, if his mine ever produced visible gold. He replied "God forbid; if it did, the gold would all go into the miner's pockets who dug it. If invisible it comes to mine."

Sometimes these mills have warm water put into them for particular uses. The whole process is precisely what Mr. Berdan accomplishes with more perfect tools.

It appears that with one of Mr. Berdan's machines sixteen tons of quartz per day have been crushed, at 13s. 9d. per ton. But after the gold is taken out there is left a mass of dirt that needs putting into its proper place. As this dirt is quartz, or silex in an impalpable powder, it is precisely the most valuable material used in the manufacture of china ware, viz. ground flint. It would therefore pay to grind up quartz that would yield 13s. 9d. worth of gold to pay the expenses, leaving the ground silex for profit, at the value of 2*l.* 4s. per ton, if free from metallic colouring.

An important national industry might thus be promoted, and the "dirt" prove more valuable in reality than the precious metal. It might pay to bring quartz-rock home as ballast, from abundant new veins yet to be found in the nearest ports of Mexico; and if the ground silica, by reason of containing metallic oxide, be unfitted in some cases for china ware, probably it would be found useful to the farmer as a manure for clayey wheat lands, or for the process of forming artificial stone. But this is all based on the supposition that gold maintains its value as a precious metal. If the quantity increases so as materially to lower the price, the circumstances will change.

I am, Sir, yours, faithfully,

W. BRIDGES ADAMS.

one result of the American possession of California would be a large influx of gold—in their phraseology, "that Jonathan would dig a tarnation big hole to the Antipodes, to get at the molten gold, heaviest of metallic bodies."

The latest discoveries in Australia tell of great riches found in very deep pits; these are underground beds of torrents over watercourses now filled up, and which contain the fragments. It will be probably found that these watercourses run parallel to each other at right angles with the ranges of mountains, and that the way of working will be to intercept them by working across them, and on striking them, to work up and down along the course; and when they get richest the history will probably be like most Spanish gold mines—"the water came in." And then the steam engine must go to work to drain. But gold digging in gullies is but haphazard work for the labourer, and not a speculation for the capitalist. The quartz veins are a legitimate operation, which may be conducted without robbery. How to remove the alluvial covering and lay bare the runs of the original mountain torrents, to get at the gold by a company, is a difficult problem. Deep beneath the river beds of the Spanish Peninsula will probably be found gold enough, when they shall be laid bare by effective irrigation of the land.

MEASURMENT OF TONNAGE.

SIR,—In common with all interested in shipping, I read with great pleasure the letters which appeared in the Journal some time ago on the subject of tonnage; and regret the discussion should have been dropped before some definite result was arrived at. My object will, however, be attained, if I can induce those gentlemen belonging to the Society who may be conversant with the question to communicate their views, and thus lead to some decision upon the best course to be adopted to secure the desired alteration in the law. I will assume that the authorities upon whose report the present mode of mea-

surement was made law, had arrived at the true form of a perfect ship, and that, if all ships were built on the principles which governed their decision, every vessel would pay its fair quota of dues, and no injustice would be done. By a perfect ship, I mean one which, as an investment, if no peculiar influences operated, a shipowner would prefer as being the most profitable, viz.—the vessel which, with the same rate per cent. depreciation for wear and tear as other vessels, would, from its sailing qualities, command the highest freight, and, in given time, make the greatest number of voyages, and from its capacity, carry the largest cargoes; the three must be taken together. Vessels are the more perfect the nearer they approach this standard; nevertheless intentional deviations occur in two directions. The first is in regard to capacity. If we increase the dimensions in those parts of a ship where the dimensions will not *tell* in the estimate for dues, a saving is effected to the shipowner; the possibility of doing this being known to him, he expects and requires his vessel to carry twenty per cent more than her registered tonnage; and, like other manufacturers, the shipbuilder works up to the requirements and expectations of his market. By variation from the perfect form upon which I have assumed the present mode of measurement to be based, the capacity for cargo may be increased without increasing the dimensions which regulate the tonnage dues, but this can only be done at the sacrifice of the other element of perfection speed. The second deviation is in the opposite direction. With the intention of increasing the sailing qualities, such a form is frequently adopted as necessarily reduces the space for cargo; hence some vessels pay more dues than fairly rendered liable to by the cargo. They do not carry what their register states. By the alteration of the law which is proposed, so that the actual capacity shall be taken for the calculation of the dues, the encouragement at present held out to the shipbuilder to construct ill-formed vessels would be removed, as he would cease to gain anything by departing from the best model.

The subject is of great importance, both to human life and property, numbers of vessels being annually lost entirely from their bad construction; they are unweatherly, and drift to leeward and ashore, when better modelled ships keep to sea. As an illustration of the increasing attention paid by merchants to the build of ships, I may mention that of two vessels lying in the same dock, and bound to the same port, one being reputed of good build, and therefore likely to prove a fast sailer (not having made a voyage, it was entirely a matter of opinion), had more goods offered at *5l.* per ton than she could take; the other having a different reputation, did not succeed in obtaining a full cargo even at the low rate of *3l.* per ton. I have not gone into details, my object being to suggest rather than exhaust the subject. I shall be happy to hear of the Society investigating the matter thoroughly. The views of the principal shipbuilders, shipowners, merchants, Chambers of Commerce, and scientific men might be collected, and their opinions embodied in a representation from the Society of Arts to the government, and a speedy alteration in the law would, I trust, be the result.

Yours truly, W. S.

December, 19th, 1853.

Proceedings of Institutions.

Halsted.—A very interesting lecture on Australia and her gold-fields, illustrated by diagrams, was delivered to the members of the Mechanic's Institution on Tuesday evening, the 6th of December, by Mr. W. N. Froy, of London. He commenced with the early discovery and history of the country, tracing its progress to the present time so far as explored: with observations upon its fertility, the peculiarities connected with its animals, vegetation and fruits; the large quantities of sheep, and the supply of wool; and last but not least, its wonderful possession of golden ore. He explained the various and improving methods of extracting it, and concluded with some remarks upon the class of persons most suitable for emigrants.

Yarmouth (Great).—A special general meeting of the members was held on Monday fortnight, to consider a report from the Accomodation Committee, which had been appointed to enter into negociation with the directors of the Yarmouth Club-house. It appeared that by the trust deed of the company there was no power to effect a sale. Under these circumstances, and feeling the necessity for enlarged premises, Mr. James Barber, the secretary, suggested that the general committee should be empowered to raise a fund for the purpose of providing a building adequate to the daily increasing demands of the society. This proposal was cordially acquiesced in, and the committee were authorised to establish a fund by *1l.* shares, or otherwise.

Miscellanea.

Rewards to Men of Genius.—The President of the United States of America, in his message delivered to Congress, on the 6th inst. says, "I commend to your favourable consideration the men of genius of our country, who, by their inventions and discoveries in science and art, have contributed largely to the improvements of the age, without, in many instances, securing for themselves anything like an adequate reward. For many interesting details upon this subject I refer you to the appropriate reports, and especially urge upon your early attention the apparently slight, but really important, modifications of existing laws therein suggested."

To Correspondents.

Erratum, Page 27.—In the Second Edition of the Abstract of Dr. Playfair's lecture on Food, an important typographical error has been corrected. The last line of the Prison Diet, described as "solitary confinement," should be struck out, as it was a reprint of the line of diet for classes 4, 8 and 7. These classes have 229 oz. per week of food for female prisoners, but for males, 271 oz.

MEETINGS FOR THE ENSUING WEEK.

Tues. Royal Inst., 3.—Professor Faraday, "On Voltaic Electricity."

Wed. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Society of Arts, 8.—Soiree. Exhibition of Recent Specimens of Chromo-Printing.

Thurs. Royal Inst., 3.—Professor Faraday, "On Voltaic Electricity."
London Inst., 7.—Mr. T. A. Malone, "On Photography."

Sat. London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany.
Royal Inst., 3.—Professor Faraday, "On Voltaic Electricity.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

From Gazette, 16th December, 1853.

Dated 20th October, 1853.

2428. J. Woofenden, Belfast—Power-looms.

Dated 1st November, 1853.

2532. T. S. Bale, Cauldon place, and D. Lucas, Stoke-upon-Trent, Staffordshire—Ornamenting articles and materials in pottery, etc.

Dated 2nd November, 1853.

2542. B. Butterworth—Combining oil with other liquids for lubricating compound. (Partly communicated.)

Dated 3rd November, 1853.

2554. P. Hindle, Ramsbottom, Lancashire—Power-looms.

Dated 4th November, 1853.

2558. J. Scott, Shrewsbury—Apparatus for shifting carriages on railways, etc.

Dated 12th November, 1853.

2622. S. Barker, Birmingham—Shaping metals.

Dated 15th November, 1853.

2648. J. Fry, 19, Cannon street west—Solvents for India rubber and gutta percha, and rendering fabrics waterproof without odour.

Dated 28th November, 1853.

2755. J. Wormald, Vauxhall, and G. Pollard, York road, Lambeth—Pipe wrench.
2757. J. Stenson, Northampton—Manufacture of iron.
2759. H. Goutte and J. M. Hammebacher, Paris, and 16, Castle st. Holborn—Machine for washing linen, etc.
2762. A. E. L. Bellford, 16, Castle street, Holborn—Straining mill saws.
2763. T. and J. Chambers, Thorncliffe Iron Works, Sheffield—Kitchen sinks.
2765. J. M. Perodeaud, 35, Rue Godot de Mauroy, Paris—Converting peat into artificial coal, etc.

Dated 28th November, 1853.

2767. J. Walmesley, Accrington—Looms.
2769. R. H. Nicholls, Bedford—Hoeing and cultivating land.
2772. A. Macomie, 6, Percy street, Rathbone place—Furniture, forming writing or drawing case.

Dated 29th November, 1853.

2775. P. Kelly, 111, West street, Drogheda—Cultivating etc., land.
2779. J. Moore, Lincoln—Ploughs.

Dated 30th November, 1853.

2781. J. Jackson, Wolverhampton—Signalling apparatus.
2782. J. Eloe, Manchester—Spinning machinery.
2783. P. A. le Comte de Fontainemoreau, 4 South street, Finsbury—Jacquard machine. (A communication.)
2784. E. R. Davis, 1, Howley street, Lambeth—Pipes, &c., from lead and other soft metal forced through receivers, &c.
2785. J. Hewitt, Salford—Spinning machinery.
2786. J. Redford, Pilkington—Power looms.
2787. R. Balderstone, Blackburn—Spinning machines.
2788. J. Patterson, Beverley—Land rollers or clod crushers.
2789. A. Loubat, Paris—Tramways.
2790. L. Jennings—Plain and ornamental sewing, and machinery for same.
2791. N. de Landtsheer, Ghent—Combing machines for flax, etc.
2792. F. S. Cole, Childown—Smoke-consuming apparatus.

Dated 1st December, 1853.

2783. T. Garnett, Low Moor, near Clitheroe, and D. Adamson, Duckinfield—Generating steam, and consuming smoke.
2794. A. E. L. Bellford, 16, Castle street, Holborn—Machinery for making horse shoes. (A communication.)
2795. A. J. Jones, New Oxford street—Cigar light.
2786. J. Dilworth, Preston—Escape and safety valves.
2787. T. and J. Hollinsworth, Winwick, Lancashire—Alarm whistles.
2798. J. H. Johnson, 47, Lincoln's inn fields—Manufacture of caoutchouc. (A communication.)
2799. J. H. Johnson, 47, Lincoln's inn fields—Vulcanised India rubber. (A communication.)

Dated 2nd December, 1853.

2800. J. Reilly, 56, Thomas street, Manchester—Tenoning, mortising, and sawing machinery.
2801. A. W. Callen Peckham—Excavating machine.
2802. A. E. L. Bellford. 16, Castle street, Holborn—Ships' stocks. (A communication.)
2803. H. Deacon, Widnes, Lancashire, and E. Leyland, St. Helen's—Sulphuric acid.
2804. A. Brown, Glasgow—Metallic casks, etc.
2805. G. Williamson, Glasgow—Motive power.
2806. A. Bain, Paddington—Damping paper for reception of labels, &c.
2807. J. C. Wilson, Redford Flax Factory. Thornton, Kirkaldy—Scutching machinery.
2808. G. Collier, Halifax—Looms.
2809. R. Reybourn, Baker street, Greenock—Sugar refining.
2810. S. C. Lister, Bradford—Combing wools, etc.
2811. H. Bessemer, Baxter house, Old Pancras road—Manufacture and refining of sugar.
2812. J. Saunders, St. John's wood—Rails for railways.

Dated 3rd December, 1853.

2814. A. Rogers, Bradford—Ventilating sewers, etc.
2816. W. Dray, Swan lane, London—Portable houses.
2818. H. J. Iliffe and J. Newman, Birmingham—Metallic bridges, etc.

Dated 5th December, 1853.

2820. S. Cheavin, Spalding—Filterer.
2822. W. Simons, Glasgow—Propelling and steering.
2824. J. Patterson, Beverley—Reaping machinery.
2826. J. Robertson, Kentish town—Consumption of smoke.

Dated 6th December, 1853.

2828. E. Oldfield, Salford—Spinning machinery.
2834. W. E. Gaine, 4, Harewood street—Treating or preparing paper.
2836. J. H. Johnson, 47, Lincoln's inn fields—Printing oil cloths. (A communication.)
2838. J. Hargraves, Kirkstall, Yorkshire—Washing and scouring wool.

WEEKLY LIST OF PATENTS SEALED.

Sealed December 15th, 1853.

1446. Thomas Butterworth, of Meanwood, Yorkshire—Machine for ploughing land, harrowing and crushing clods at one operation.

Sealed December 16th, 1853.

1449. Charles Wye Williams, of Liverpool—Improvements in the manufacture of sheet iron, and of iron plates used for boilers, vessels, buildings, and other like purposes.
1401. William Christopher, of Euston square, and Gustavus Gidley, of Hoxton—Improvements in abstracting sulphur and other matters from vulcanised India rubber.
1462. John Blair, of New Milns, Ayrshire—Improved mode of cutting lappet cloths, or other similar fabrics.
1464. Jules Alexis Adrien Dumoulin, of Paris—Improved instrument for measuring and tracing.

Sealed December 8th, 1853.

1477. Auguste Edouard Loradoux Bellford, of Castle street, Holborn—Improved stove or kiln.
1478. Robert Lister, of Scotswood, Northumberland—Improvements in chimney tops or flues.
1479. Henry Bleasdale, and Joseph Bleasdale, both of Chipping, Lancashire—Improvements in working, tilling, or preparing land.
1484. Henry Saunders, of Yeovaney, Staines—Improvements in drying grass and other crops.
1488. Thomas Adamson, and William Adamson, of Sunderland—Improvements in pumps.
1494. John Cross Richardson, of Lilly hill, near Manchester—Improvements in machinery or apparatus for winding yarn.
1495. John Cross Richardson, of Lilly hill, near Manchester—Certain improvements in looms for weaving.

Sealed 19th December, 1853.

1522. Frederick Ayckbourn, of Guildford street, Russell square—Improvements in the manufacture of waterproof fabrics.
1530. Thomas Weatherburn Dodds, of Rotherham—Improvements in the manufacture of files, rasps, and other edge-tools usually made of steel.
1555. John Mason, of Rochdale, and Luke Ryder, of the same place—Improvements in machinery or apparatus for preparing and spinning cotton and other fibrous substances.
1587. Edward Clarence Shepard, of Trafalgar square—Improvements in magneto-electric apparatus, suitable for the production of motive power, of heat and light. (A communication.)
1591. Edward Clarence Shepard, of Trafalgar square—Improvements in the manufacture of gas. (A communication.)
1596. François Mathieu de Amezaga, of Bordeaux—Method of obtaining motive power, and certain machinery or apparatus employed therein.
1715. John Robison, of Coleman street—Improved apparatus for making tea and coffee, and other infusions or decoctions for chemical and other purposes.
1726. William Thorp, of Collyhurst, near Manchester—Improvements in machinery for finishing and embossing plain and fancy woven fabrics.
1910. Archibald Douglass, of Norwich—Improved machinery for stitching, back-stitching, and running.
2052. James Davis, of the Low Furness Iron Works, near Ulverstone, and Robert Ramsay, of the same place—Improved engine, to be worked by steam, air, or water.
2112. Peter Rothwell Arrowsmith, and James Newhouse, both of Bolton-le-Moors—Certain improvements in machines for spinning and doubling.
2263. Henry Jacob Jordan, of Berners street—Improved medicine for the cure of venereal affections, which he denominates "the Treisemar." (A communication.)
2331. James Hall Nalder, of Alvescott, and John Thomas Knapp, of Clanfield—Improvements in winnowing or dressing corn.
2350. Charles Scott Jackson, of Cannon street—Improvements in preserving timber and other vegetable matters.
2429. John Henry Johnson, of Lincoln's inn fields—Improvements in apparatus for sustaining bodies in the water. (A communication.
2440. Frederick Albert Gatty, of Accrington—Improvements in printing or producing colours on textile fabrics.
2469. Edward Austin, of Pembroke cottages, Caledonian road—Improvements in surveying and raising sunken vessels, and in apparatus used therein, and lifting vessels over bars and other obstructions.
2471. Richard Heyworth, of Cross hall, near Chorley, and Thomas Battersby, of Cross hall, aforesaid—Certain improvements in looms for weaving.
2506. William Betts, of Wharf road, City road—Certain improvements in machinery for manufacturing metallic capsules.
2515. Anthony Park Coubrough, of Blanefield, Stirling, N. B.—Improvements in printing textile fabrics and other surfaces.
2538. Edward Ward, of Potton, Bedfordshire—Improvements in carriage axles. (A communication.)

Sealed 20th December, 1853.

1499. Charles Crickmay, of Handsworth—Improvements in the construction of firearms.
1500. John Paul, of Manchester—Colouring paper on the surface.
1505. John William Perkins, of Narrow street, Limehouse—Improvements in the manufacture of artificial manure.
1510. Robert Galloway, of Cartmell, Lancashire—Improvements in manufacturing and refining sugar.
1512. Joseph Skertchley, jun., of Kingsland—Improvements in the application of baths to articles used for resting the human body.
1514. Henry Blatin, of Rue Buonaparte, Paris—Improvements in buckles.

Journal of the Society of Arts.

FRIDAY, DECEMBER 30, 1853.

MEETING OF COUNCIL.

WEDNESDAY, DECEMBER 28, 1853.

AT a Meeting of Council held on the 28th inst., the following Institutions were taken into Union:—

318. Buckingham, Literary and Scientific Institution.
319. Dursley, Young Men's Society.
320. Hyde, Mechanics' Institution.
321. Louth, Mechanics' Institution.
322. Banbury, Mechanics' Institute.
323. Swansea, Royal Institution of South Wales.

SWINEY PRIZE.

The Council announce that, on the 20th of January next, in accordance with the will of the late Dr. Swiney, "a silver goblet, of the value of 100*l*., containing gold coin to the same amount," will be awarded "to the author of the best published work on Jurisprudence."

GALLERY OF INVENTORS.

The Council have much pleasure in giving publicity to the following letter, which has been received from His Royal Highness the President:—

"Osborne, December 16th, 1853.

"SIR,—I am commanded by His Royal Highness Prince Albert, to request that you will bring under the consideration of the Council of the Society of Arts, a suggestion which has been made to His Royal Highness, the adoption of which, it appears to him, may perhaps be desirable.

"Among the exhibitions of various kinds which are from time to time promoted by the Society, it seems to His Royal Highness that it might prove useful, and could scarcely fail to be highly interesting, if a series of authentic portraits of distinguished inventors, either in art or science, were collected for exhibition on some future occasion, and historically classified.

"The names of most of those who are thus distinguished, are probably familiar to the world, and nothing is needed to remind men of the reputation they have so justly earned, or of their works. Still, even in their case, it would be interesting to present us, as it were, with their very features. But there are others who have done scarcely less for the happiness, comfort, and improvement of their fellow men, who are hardly known even by name to the general public, which is daily profiting by their inventions; and it becomes almost a duty towards them, to endeavour, in this manner, to rescue them from oblivion, and enable them to take that place among the benefactors of mankind to which they are fairly entitled.

"Great care should, however, be taken in the selection, only to include those whose inventions have had an important and beneficial effect in improving the condition of the people generally, and in advancing science, and in whom, consequently, all should feel an equal interest.

"An attempt to form a collection of this description might also prove the means of rescuing from destruction many records that may still exist of bygone men, eminent in science or in art—and if a catalogue were added, containing some short biographical sketch of their lives, it might tend to the further useful result of leading others to study and attempt to emulate the means by which such men acquired their reputation.

"I have the honour to be, Sir,
"Your most obedient Servant,
"C. GREY.

"Peter Le Neve Foster, Esq."

ILLUSTRATIVE ART.

EXHIBITION OF CHROMO-PRINTING.

On Wednesday evening, the 28th inst., a Conversazione took place at the Society's House, for the private view of the recent specimens of Chromo-Lithography, Printing in Colours, and Nature Printing. The Council have to thank Messrs. Jackson and Graham for the Bronzes and other specimens of manufactured Art exhibited on the tables.

The progress of illustrative Art, and the means which have been employed of late years to facilitate and cheapen reproduction in copying the work of the artist in effect and colour, cannot fail to excite interest. In this limited space it is impossible to give a complete history of its progress, a brief statement of the most important processes in use must suffice.

Wood-block engraving has been employed for centuries past, but Bewick may be said to have given the great impetus to the use of wood-blocks. The advantage of the wood-blocks for illustrative purposes consists in the inked surfaces being raised, thus enabling them to be employed in combination with the ordinary types, so that the letter-press and illustrations may be printed at one operation. In the early stages of the art, however, the works were deficient in detail and artistic effect. This led to the introduction of the mezzotint and aquatint processes of engraving for broad effects, and copper-plate or line and chalk-engraving for works requiring a further degree of precision. These four processes are entirely distinct from wood-block engraving, and cannot be used in combination with letter-press. In the mezzotint the surface of a copper-plate was scratched in such a manner as to produce upon it a rough face, forming a uniform ground for retaining the printing-ink. The lights were obtained by reducing the roughness by burnishing. In the aquatint process, a rough face on the copper was obtained by covering it with a ground which dried in reticulation. Upon this dilute aquafortis was poured, which eat into the surface of the plate wherever unprotected by the varnish, thus forming a means for retaining the printing-ink; and the lights are obtained by burnishing, as in the mezzotint. Line-engraving, however, is essentially distinct, and is directly the reverse of wood-block engraving, all the parts producing the print being cut in lines into the copper, more or less deeply, instead of being in relief, as in wood-blocks or surface printing. By this means delicacy of touch and

precision of outline could be obtained better than by the mezzotint or aquatint process. A fourth process was, however, introduced about the same period, known as chalk engraving, and to this reference will be made hereafter. The peculiarity consisted in producing on the surface of the copper, by appropriate tools, a series of dots, giving the granulated effect of a chalk or crayon drawing on paper.

Early in the present century it was discovered that steel could be employed with advantage by the line-engraver in place of copper. At this period came into notice Lithography, which was then discovered, by Senefelder. Baron Aretin, of Munich, Count Lasteyrie, in Paris, and Mr. Ackermann, in London, fostered the rising art; and in 1819 Senefelder's account of Lithography appeared, with illustrations. The most striking plate in the work is a portrait of Senefelder, which serves to show the then condition of the art. Senefelder, however, was unsuccessful in his endeavours to establish lithography in England. This was accomplished by Mr. Hulmandell, who did so much towards improving the art, and some of whose early specimens of printing in colours are included in the present exhibition. Lithography, or printing from stone, may be described as drawing on the smooth surface of a peculiar description of porous stone with some greasy material. The stone is then wetted, and the printers' ink, when applied, being of an oily nature, adheres to those parts only of the stone on which the subject has been drawn; and thus the impression is taken or printed on paper. The processes employed by Senefelder may be divided into four classes. 1st. The chalk mode, or drawing with hard grease, in the shape of a lithographic crayon, on the granulated surface of stone. 2nd. The ink process, in which grease is applied in a liquid state, and sinks into the pores of the stone. 3rd. The engraved mode, when the stone is incised with an etching point, and the incisions are filled with grease. 4th. The transfer mode, where the drawings or writings are made upon paper covered with a preparation of paste and alum, which forms the vehicle for receiving the greasy ink.

It is not to be denied, that at the time of its introduction the public greatly undervalued the rough freedom of lithography; and it was not till after Hulmandell had introduced a series of improvements in the processes employed that it was favourably received by artists. The first English artist who made use of lithography in England was the late William Nicholson, who sketched landscapes on stone with great facility. Mr. Samuel Prout and Mr. J. D. Harding were also among the earliest and most successful of those who adopted lithography. In portraiture lithography was early employed; and among those portrait painters who have themselves drawn upon stone, may be mentioned Messrs. Doyle, Eddis, Hayter, Linnell, and Sir William Ross, R.A. Lithography, from having hitherto been regarded as inferior to engraving, now came to be thought of as a rival to that art; but hitherto it has been unable to produce in black and white such effects as the mezzotints of Cousins and Lewis, or the line engravings of Doo and Robinson, Heath and Finden. The Portrait of Senefelder, in his work, is one of the first specimens of printing with a tint. The drawing with chalk was first printed, and on that impression the neutral tint was printed from another stone, the parts representing the high lights being left white; but the effect of the high lights was harsh and crude. This objection Mr. Hulmandell overcame by the introduction of a drawing material between ink and chalk, which, being applied to the hard edges of the liquid ink, carried the full tint by gradation into the white lights.

The early efforts of Senefelder in printing in colours gave but a faint idea of the richness and beauty of the productions of Mr. Owen Jones and other artists. Mr. Hulmandell was the first to develope the resources of colour printing, and the method he employed was to transfer the required outline to several stones, the first stone giving the outline and black parts, a second the red, a third the yellow, &c. The power of producing graduated tints with ink and chalk combined, enabled Mr. Hulmandell to take the lead in the production of pictorial effects; and Mr. Owen Jones has carried this to a still higher point by graduating tints in ink only, by stippling on polished stones with the fine point of a camel-hair pencil, as illustrated by his work, "Flowers and their Kindred Thoughts." And this process, somewhat modified, is at present largely employed in the production of artistic effects.

The next and most important improvements in the art were also due to Mr. Hulmandell, namely, the processes known as the lithotint and stump drawing. The aquatint process of engraving has already been alluded to, and lithotint is a modified application of the same principle to stone. Washes of a greasy liquid are applied with a brush to the stone. As the stone imbibes the liquid ink at every pore, the hollows as well as the summits of the granulated surface of the stone alike receive the grease, and the resulting impression when printed would be a mass of colour. To neutralize this effect, Mr. Hulmandell made on the surface of the stone thus washed an aquatint ground, and then applied strong acid, which bit through the film of grease in those parts exposed through the aquatint ground to the operation of the acid, and by means of the granulation thus produced the effect of gradation of tint was obtained. The other extension of the powers of Lithography was drawing with the ordinary stump on stone, a process which enabled artists to produce drawings on stone with the tools they use in drawing on paper. Such is a resumé of the condition of the art at the time when the Society held its exhibition of lithography in 1847. A consideration of the effect which this new art has had upon its predecessors, shows that, owing to the facilities which lithography has afforded for obtaining broad effects in combination with printing from the surface, the aquatint process has been entirely superseded; and although the mezzotint and chalk processes have been combined, as illustrated by the works of Mr. Wagstaff, yet the production of works of importance in those branches has ceased. Line-engraving, too, although an independent art, has, for illustrative purposes, been set aside. Wood-engraving is again rising into importance, to be found hereafter in combination with lithography and colour-printing. Of the specimens now exhibited, those by Baxter serve to illustrate the efforts which have been made to give fresh life to the art of aquatint engraving, by combining it with the chalk process before described, so as to get detail and precision of drawing in the minuter parts, at the same time that chromatic effect is obtained by the combination of a series of tints printed from aquatint grounds. The specimens by Leighton Brothers are produced by another modification of the aquatint process, in combination with wood-blocks, and are surface printed; or by a combination of wood-blocks with tints printed from lithographic stones. The process employed by Messrs. Leighton, in order to obtain the aquatint metal blocks, is the electrotype from a copper plate, the surface of which has been prepared by the action of acid and the aquatint ground; thus, by a series of blocks in relief variable effects are obtained with the required boldness or delicacy of surface. The great point to be attained is precision of drawing by a combination of tints, at the same time that the lines or vanishing points of the tints are studiously lost. The specimens of Chromo-Lithography exhibited by Messrs. Brooks, Day, Hannhart, Leighton, Rowney, &c., depend for their perfection in the production of coloured pictures and objects on getting rid entirely of positive lines, and dispensing with what is technically called the 'black stone' or printing with black ink. The artistic effects are produced by the increased number of stones and the use of half tints. Thus, by combining a higher artistic power with skilful manipulation, and a greater subdivision of colour, gradation of tone and blending of parts is obtained.

It now remains to call special attention to the specimens which the Society has received from Councillor Auer, of the Imperial printing office at Vienna, produced by the process known in Germany as "Naturselbstdruck," and in this country as "Phytoglyphy," or the art of printing from nature. These specimens include every variety of subject, botanical, geological, entomological, fossil, and fabrics. Very soon after gutta percha came into use, Dr. Ferguson Branson took impressions of leaves in that substance, and it occurred to him to try the effect of printing from the sunk impression so obtained, and one of the specimens now exhibited was produced in that way in 1847. It was found impossible to print them with a clear margin from the gutta percha, and this led to the use of an electrotype fac-simile in copper, which allowed of the margin being burnished and the plate wiped clean; this succeeded well. In 1850, Dr. Branson had occasion to get an object cast in brass, and the beauty of the casting was so great that he at once determined to have a cast made from a gutta percha impression of a fern, and see the result. When every part of the brass-plate was burnished with the exception of the impression, it was tested in printing, and the result proved most successful. When a few plates had been finished the subject was brought before the Sheffield Literary and Philosophical Society, on the 6th December, 1850, through which channel it reached the local newspapers, and was copied into various other prints. In the year 1851 Dr. Ferguson Branson communicated to the Society an Account of a Method of Engraving Plates from Natural Objects, which was read at a meeting held on the 26th March in that year, and which was published in the Notices of Proceedings. At that time Dr. Branson only contemplated the application of the process to ferns, leaves, sea-weeds, and other flat objects. It subsequently occurred to Dr. Branson that the brass-casts might be employed in place of wood-blocks in surface-printing, the impression on the surface of the metal-block being absolutely produced from nature, and he believes that this plan will become extensively used. A specimen of this process is included in the collection. The novelty in the process by which the specimens of plants, fabrics, and other flat objects received from Vienna are produced, consists in the use of lead for receiving the impression in place of gutta percha. The plants or other objects are laid on a steel-bed, over which is placed a sheet of lead, which is then submitted to a rolling pressure. The specimens of agates are produced by applying to the polished surface a weak acid, which acts with different degrees of intensity in the various layers, causing greater or less indentation. The impressions of the fossils are obtained by covering the original with liquid gutta percha. In each case an electrotype plate is taken in copper, from which the impressions are printed. Messrs. Bradbury and Evans also exhibit specimens of English productions, and are now actively engaged in carrying out the several processes described above.

PROPERTY IN INVENTION(a).

Mr. T. Webster has just published a work on the right of property in inventions and designs. The subject is one of great importance generally, and has peculiar interest for the members of this Society; it has, therefore, been considered that a statement of the principles adopted by the author will not be out of place in the Journal.

Mr. Webster thus commences his work. He says—

"Property in the results of intellectual labour, whether copyright in music, literature, the fine arts and designs, or patent right in inventions in the arts and manufactures, has usually been regarded in its origin, rights, and protection, as presenting so many difficulties that the branch of jurisprudence relating thereto has been termed the metaphysics of the law. But it may be doubted whether this property, either in respect of its origin or of the principles on which it is founded, presents any difficulties not common to other species of property.

"Jurists and metaphysicians have advanced various, and in some respects inconsistent, opinions on the origin and rights of property; some treating the conception of property as an original notion inherent in the mind, others as evolved from a previous sense of justice, its protection and distribution being regarded as matter of public policy to be provided for by the laws of each particular country.

"The idea or conception of property is antecedent to any notion of law; it is not the law of the land which constitutes the basis of property; neither does natural justice constitute property; justice is a virtue which presupposes property, and respects it however constituted; justice, as a moral virtue, is not the creation of property but the conformity of our actions to those views of property which vary in the various states of society(a). The universal recognition of and respect for property and the rights of its owner are not the results of the wisdom or authority of patriots and legislators deliberating on what was best for the good and order of the community, but the results of a prior wisdom employed in framing a constitution not for a state but for human nature(b).

"The possessory feeling as the result of mere occupancy, is common to our nature and anterior to the application of any principle of natural justice or the sanction of positive laws. The feeling derived from occupancy acquires additional strength if labour has been bestowed by the individual on the subject of his occupancy, and is in accordance with a principle which is sometimes referred to, as the natural right of property, namely, that every man is proprietor of the fruit of his own labour, and that to whatever extent he may have impressed additional value on any given thing by the work of his own hands, to that extent, at least, he should be held to be the owner of it(c).

"These two principles of ownership, by reason of occupancy or of the expenditure of individual labour, may be regarded as the origin of property. The feelings thus engendered are so natural and strong that the claim to the exclusive enjoyment of property is deferred to by others, and the occupant is allowed to remain in the secure and unmolested possession of that which he rightfully claims. The deference thus rendered to rightful claims gives rise to the sense of equity or natural justice prompting to likeness or equality between the treatment of others and the treatment claimed from others. So that if the sense of property be anterior to the sense of justice, and comes from an anterior and distinct source in our nature, the proprietary feeling in the heart of individuals does not originate from a sense of justice, which only arbitrates between the proprietary claims and feelings of different individuals after those feelings have arisen by the operation of other principles in the human constitution.

"The principles here adopted as the true explanation of the origin and rights of property, are thus illustrated by Chalmers:—'Justice did not create property, but found it already created; her only office being to decide between the antecedent claims of one man and another. And, in the discharge of this office, she but compares the rights which each of them can allege, as founded either on the length of undisputed and undisposed of possession, or on the value they had impressed on the thing at issue by labour of their own. In other words, she bears respect to those two great

(a) *On Property in Designs and Inventions in the Arts and Manufactures.* By Thomas Webster, Esq., Barrister-at-Law.

(a) See Dr. Thomas Brown on the Philosophy of the Human Mind, Lecture 83.

(b) See Dr. Chalmers's Bridgewater Treatise, Vol. I. chap. vi. p. 228.

(c) Ibid. p. 243.

primitive ingredients by which property is constituted, before that she had ever bestowed any attention, or given any award regarding it. The matter may be illustrated by the peculiar relation in which each man stands to his own body, as being in a certain view the same with the peculiar relation in which each man stands to his own property. His sensitive feelings are hurt by the infliction of a neighbour's violence upon the one, and his proprietary feelings are hurt by the encroachment of a neighbour's violence on the other. But justice no more originated the proprietary than it did the sensitive feelings; no more gave me the peculiar affection which I feel for the property I now occupy as my own, than it gave me my peculiar affection for the person which I now occupy as my own. Justice pronounces on the iniquity of any hurtful infliction by us on the person of another—seeing that such an infliction upon our own person, to which we stand similarly related, would be resented by ourselves. And justice, in like manner, pronounces on the inequality or iniquity of any hurtful encroachment by us on the property of another, also seeing, that such an encroachment upon our own property, to which we stand similarly related, would be felt and resented by ourselves. Man feels one kind of pain when the hand which belongs to him is struck by another, and he feels another kind of pain when some article which it holds, and which he conceives to belong to him, is wrested by another from its grasp. But it was not justice which instituted either the animal economy in the one case, or the proprietary economy in the other. Justice found them both already instituted. Property is not the creation of justice, but is in truth a prior creation. Justice did not form this material or command it into being, but in the course of misunderstanding or controversy between man and man, property, a material pre-existent or already made, forms the subject of many of those questions wich are put into her hands. (a)

"Such would appear to be the true principles of the origin and rights of property, whether as exemplified in the appropriation of a portion of the unappropriated soil by the first occupant, or of the wild animal which the sportsman may have caught, or of the tree which the savage may have felled, or of the hut which he may have erected in the wilds of the forest, or of the results of intellectual labour.

"These feelings of proprietorship, and the consent given to these principles, are so universal that they have been called natural rights; but this origin and these rights of property so acquiesced in must be distinguished from other rights more appropriately termed natural rights—as a right to the free use of the air, light, and the rain of heaven; these are common to all, because they are bestowed equally on all; and though each person is at liberty to enjoy as much of these as he pleases, long continued occupancy and enjoyment may, even in respect of these, confer certain privileges which cannot be interfered with without the consent of the proprietor.

"The principles to which property in literature, music, or the fine arts, or in a design, or invention in the arts and m anufactures, that is, property in the result of intellectuallabour, must be referred, are the same as those to which other descriptions of property are referred, and the same sense of natural equity or justice acts as arbitrator between the antecedent or conflicting claims of proprietorship by different individuals. These principles being recognised, the laws of civilized states act as an auxiliary to ratify the constitution which the natural feelings and intellects of mankind had established, and perpetuate or defend from violation the order of things which it had ratified. Property thus created and recognised is protected and regulated, as to its mode of enjoyment, by the positive laws of each separate community.

"The term natural rights has been much misapplied in reference to the origin or rights of property and its enjoyments. It may be said that every child born into the world, in addition to the natural right of distending its lungs by a portion of the air, or of educating its eyes by the light of heaven, or of acquiring knowledge from the external world around, has a natural right to that nourishment, shelter, and protection which may be necessary for its existence and sustenance, and to that education in the most extensive sense of the term which may be necessary for the proper discharge of the duties of a member of a community; and in most civilised nations the government, as having the ultimate control of all property, subjects its enjoyment to certain conditions for supplying such necessities when the occasion arises.

"It is important that the true principles of the origin of property should be kept in mind, because a distinction has been supposed to exist between the original principles upon which property, as the result of manual or bodily skill and labour, and the result of the brain or intellectual labour, are founded, whereas if the preceding views be correct, the recognition of what is due to first occupancy and to proprietorship in the fruit of individual labour is equally applicable to the productions of physical and of mental labour.

"And this is the more important because property in literature, or in designs, and invention in the arts and manufactures, has been supposed or represented to derive its origin from, and to have no foundation except the positive law of nations, or what may be termed municipal regulations. Without, however, entering further into a discussion of questions of so much difficulty and refinement, and on which writers of the greatest eminence on natural law and ethics are by no means agreed, the preceding may suffice to afford strong grounds for the opinion that the origin of all property is the same, being derived from the same general principles upon which the foundations of society rest, being in fact part of the constitution of man, of those principles which are the provision not of man but of God."

The author goes on to say—

"Whatever may be the true theory of the origin and rights of property, it is certain that creations of the mind or intellectual labour, when embodied in a practical form so as to be available to mankind, whether in books, music, paintings, designs, or inventions in the arts and manufactures, have been recognised almost universally by writers on jurisprudence, on ethical philosophy, and on political economy, and by civilised communities, as a subject of property and protection equally with the material forms in which such creations are embodied. To deny to the cultivated mind or educated man property in the productions of his peculiar labour, or of the exercise of those powers by which he is distinguished from his fellows, and which it has been the object of his education to improve to the utmost, is a proposition which in terms has as yet found no advocate, although the alleged opinions recently advanced on the subject of patent rights for inventions would appear to lead inevitably thereto. To deny to the creations and labour of the mind that property and protection by the civil power which is given to the skill of the hand or to bodily labour, is in effect to make intellectual, of no account as compared with manual, labour, and to give a predominating and overwhelming influence to capital and those other representations of accumulated labour which may be profitably enjoyed without any fresh creations of mind or exercise of inventive faculties.

"If, as has been above stated, occupancy and possession be the fundamental principles of the origin and rights of property, the creations of the mind belong to their author in a peculiar and especial sense. He has sole and exclusive power and possession over them until embodied in some material form, and communicated by publication in such form to others. Further, the possession of such property has this peculiar claim derived from the nature of the subject—namely, that the subject-matter of such property did not exist like land, the air, or wild animals, as

(a) 1 Bridgewater Treatise, p. 247.

part of the common stock provided for all mankind; such property is, in the strictest sense of the term, a creation, and not a discovery or finding of something created by the great Author of all things, and already existing. The thoughts of man are peculiarly and essentially his own, and unless embodied in some practical form, and communicated by publication to the world, would die with their author. To prevent this, and ensure their preservation and publication, may be regarded as part of the policy of the law which will be further dwelt upon hereafter. . . . .

"So long as the idea remains locked up in the breast of the inventor and unembodied in any material form, or if embodied remains unpublished, its possession is inviolable, no one can, against the will of the author, become possessed of it: but so soon as the embodiment and publication take place exclusive possession is gone, and the idea which till then was locked up in the bosom of the author, becomes communicated to and capable of being imitated by those who are interested in the subject. Now, if it be borne in mind that publication is essential to the creation of property in intellectual labour, because no one knows of its existence until published, the preventing others from borrowing the idea and embodying it in like material forms becomes necessary for that exclusive possession and use of the idea which is essential to the notion of property. This restraint is the protection afforded by the laws to this description of property; the justice of such protection is derived from the feeling of what is due to the first occupant or possessor; and to the fruits of labour expended on any subject; the policy of such protection may be shown from the effect which it has in giving rise to fresh productions and creations, and in the consequences which reason, analogy, and comparison, tend to show must follow from its withdrawal.

"The peculiarities of this species of property, and considerations of public policy, have led to certain regulations as to this description of property, its period and mode of enjoyment, somewhat different from those which exist as to other descriptions of property. For instance, property in lands and chattels, whether real or personal, may be enjoyed for the whole term of the natural life of the possessor, and by his family or successors in perpetuity, according to certain rules of succession. Such succession, however, as has already been stated, is matter of positive law and public policy, and the commonwealth is well justified, when it allows succession, or affords protection by the strong arm of the law and civil power, to property, in assigning in what manner such succession should take place, or for what term the property should be enjoyed."

Mr. Webster then proceeds to state the legal rights accorded to inventors in this kingdom, the United States of America, and other countries, quoting the authorities of able and learned men in behalf of his position, and combating the opinion of Earl Granville and others, who maintain that no right of property in inventions should be admitted.

DECIMAL COINAGE.

The following letter, addressed to the President of the Liverpool Chamber of Commerce, by Wm. Brown, Esq., M.P., has been ordered by the Council of the Chamber to be printed, and circulated with the Parliamentary Report, for general information. A meeting, convened and presided over by the Mayor, Mr. J. B. Lloyd, was held in the Sessions-house of Liverpool, on Wednesday last, to promote the subject. The first resolution, recognising the principle and advantages resulting from the system, was moved by Mr. Brown, M.P., and seconded by Mr. T. Bonch, Vice-President of the Chamber. Another resolution, pointing out the facilities attending upon a decimal coinage to all classes in the community, was proposed by Mr. T. B. Horsfall, M.P., and adopted. Copies of the resolutions were ordered to be forwarded to the Prime Minister, the Chancellor of the Exchequer, the President of the Board of Trade, and Lord John Russell.

It may be mentioned, in case any of the Institutions are desirous of petitioning Parliament in favour of this very desirable object, that Petitions are frequently of no use on account of their being improperly addressed. It should be—

"*To the Honourable the Commons of the United Kingdom in Parliament Assembled.*

The Humble Petition of the [Parish, Merchants, or whatever it may be] showeth that," &c.

The object sought to be attained should conclude with a specific prayer, thus—"Wherefore your Petitioners humbly pray that your Honourable House will be pleased to," &c. "And your Petitioners, as in duty bound, will ever pray."

Then follows the Signatures, of which one at least should be on the first sheet.

Richmond Hill, near Liverpool, 13th December, 1853.

DEAR SIR,—Considering that it is of much importance that we should not be behind any other nation in adopting a system that will abridge the labour of masters in teaching, and scholars in learning, arithmetic; that will simplify accounts and all monetary transactions, great or small; decrease the chances of error, and enable us to enter into many scientific and difficult calculations which we cannot accomplish without using decimals, and which, in many pursuits, are now used, I thought I could not render a better service than by moving in the House of Commons for a Committee to investigate the merits of a system which is adopted by four hundred millions of the human race, and whether any insuperable difficulties stood in the way of our availing ourselves of its advantages.

Before submitting my motion to the House, which embraced our currency, weights and measures, I brought it under the notice of several judicious friends, who wished me to omit weights and measures. I considered that it was right to adopt their suggestion, for, by taking up only one object at a time, it would be more easily understood, and, when carried, and its advantages demonstrated, it would remove much of the difficulty in decimalising our weights and measures, and making our system uniform throughout the kingdom.

A committee was appointed from both sides of the House, consisting of the following gentlemen:—The Right Hon. Edward Cardwell, Mr. John Ball, the Right Hon. H. Tufnell, Mr. Dunlop, the Right Hon. Lord Stanley, Mr. Moody, Mr. G. A. Hamilton, Mr. Alderman Thompson, Mr. J. B. Smith, Sir William Clay, Bart., the Marquis of Chandos, Sir W. Joliffe, Bart., the Hon. A. F. Kinnaird, Viscount Goderich, and myself, and after examining twenty-seven witnesses, the Committee made its Report, which, with the evidence, may now be obtained through any bookseller, from Messrs. Hansard, the publishers of all parliamentary papers.

The Report was unanimous in favour of a decimal coinage, and in urging the government to its adoption; indeed, there was not a single division during the frequent sittings of the Committee.

All our present gold and silver coinage can be made available. The sovereign, taken as the unit and divided into 1000 mils; the half-sovereign 500 mils; the crown 250 mils; the half-crown 125 mils; the florin 100 mils; the shilling 50 mils, and the sixpence 25 mils. The copper is the only coin that must necessarily be altered, and one, two, and five mil pieces are recommended. The half-crown, the threepenny, and the fourpenny pieces, were recommended to be withdrawn, and 10 and 20 mil pieces, and any other coins that convenience may require, from time to time issued. The nomenclature I think of very little importance; if parties choose to use the name farthings in place of mils, they may.

It has been said that if the pound sterling is adopted as the unit, that we will require an entire new silver coinage; this is quite a mistake. If the mils are marked on all new silver coinage as issued, as the committee recommended, and pass for exactly the same amount as that now in circulation, none of the present silver coinage need be withdrawn until worn out. Its remaining in circulation would at once show the least intelligent person that there was no difference in value between the old and the new.

It will be quite a matter of convenience and taste how we keep our books: to express 1*l.* 19s. 11¾d. it now takes seven figures; in decimals we do it in four figures, either 1*l.* 999mils., or 1*l* 9f. 99m., or 1*l.* 9f. 9c. 9m., all equally correct and equally simple. The other coins (not intended as coins of account) are merely for the convenience and facility of making change.

There was but one opinion in the minds of the witnesses or the Committee, that great advantages would arise from our adopting a decimal coinage, and only one witness suggested any other unit than the pound sterling, although at the same time a decided advocate of the decimal principle. He thought that we might adopt the penny. But when it was considered that the pound sterling is known to all the world in our exchanges, that our national debt, dividends, and all large contracts, rents, &c., &c., are associated in our minds with pounds sterling; and that the penny is most generally used for the small payments of the day, for which a substitute can easily be found in a new copper coinage, as before stated, the penny found no favour with the Committee.

The system of buying and selling bullion, which has been customary hitherto, has lately been abandoned by the Bank of England, which now buys and sells it decimally. The Master of the Mint, Sir J. Herschel, informed us he meant to follow its example.

Lieut.-Gen. Sir C. W. Pasley (who wrote a very excellent book in 1834, on Coinage, Weights, and Measures) and Mr. Henry Taylor gave us some very striking examples of the decreased number of figures that would be necessary, and the consequent saving of labour that would arise from our adopting a decimal system of book-keeping and calculations over that now in use.

Professor Airy, Astronomer Royal, stated that the poorest dealers of all referred everything to the standard of a pound sterling, and that to disturb it as the unit would lead to great confusion.

Professor De Morgan considered that adopting a decimal system of arithmetic would save one half or four-fifths of the time in teaching it, and leave that saving for the pursuit of other studies. He frequently finds it necessary, as a matter of convenience, to turn £. s. d. into decimals, work out his calculations in them, and reconvert the decimals into £. s. d.

Mr. Lindsey and Mr. Kirkham, who have extensive dealings with the poor, and take as much as 1000 farthings each per week, gave a very decided opinion that, if it was explained to the poor that they could get 25 mils for their sixpence in place of 24 farthings, there would be no difficulty in their meeting the change; but Mr. Kirkham thought they would prefer the name of farthing to mil. Our evidence clearly stated that the quantity of any article sold to the poor would readily be adjusted to the value of the coin received.

The Duke of Leicester gave us information that, when the Irish currency was changed from 13d. Irish to 12d. English, it was soon understood by the poor, and no difficulty arose with them.

I am quite sure that the intelligence and aptitude of the labouring classes, ready to comprehend and understand any change in the value of our coins and its advantages, are not sufficiently appreciated.

Doctor Bowring says that his Chinese servant and a Chinese boy in his service, by the use of decimals, were rapid and accurate calculators. He never knew them to make a mistake; they were an over match for him in the use of figures; and he never met a Chinaman who had not those advantages.

I need not make further allusion to the evidence before the Committee, which, with one solitary exception, was decidedly in favour of the sovereign as the unit, and there was no doubt with any one as to the advantages that would arise by getting rid of our present system of making calculations, and keeping accounts by adopting decimals.

We therefore are in this position—No government likes to venture on any great change, however beneficial it may be, unless public opinion is expressed in favor of it. The press, as far as I know, advocates the decimal system, and I have no doubt that the government is friendly to it if properly supported by the country. I therefore hope that you will encourage the adoption of the Committee's report as presented to parliament, and that you will suggest to the authorities to afford their aid by the expression of their views by petition to Parliament. This, I believe, is all that is wanting to confer a great national benefit, by putting us in a position, by a labour-saving machine (for such it practically is), more easily to meet our foreign rivals in the markets of the world. We know the advantage of labour-saving machines in all our manufacturing towns, and in our improved instruments of husbandry. The saving of labour, by increasing demand for our industry, requires more hands to carry on the work, and in every view is an important benefit.

The limits of a letter compel me merely to glance at the parliamentary evidence, which is most valuable, and which ought to be read to be sufficiently appreciated. The Board of Trade, before I moved for a Committee, had addressed letters to several parties who it was thought could give information on the subject; those parties were called before the Committee, and there never was, I may venture to say, more concurring testimony offered in favour of a decimal system than by the witnesses who attended.

You will perceive that the proposed new mil or farthing is four per cent. less than our present farthing; but that, with reference to the gold and silver coinage, this difference is compensated by your getting 25 mil pieces for a sixpence in place of 24 farthings, and 50 for a shilling in place of 48 farthings, which is a very trifling disturbance, and will be far outweighed by the advantages arising from the adoption of a pure decimal currency.

Gentlemen to whom I have spoken think it might be a great advantage if our coins were the same as those used in France or the United States, or if there was a universal coinage of the same intrinsic value in all civilized nations. There are two fatal objections to this—that it would be impracticable to get all to agree,—and all history shows that despotic monarchs, to meet the exigency of the moment, have depreciated the value of their coins; and, within my recollection, the United States, to get more gold into the country, and prevent their own leaving them, increased the value of the sovereign from 4.44 dols. to 4.84 dols.; and I believe it is now under consideration, if not actually done, to depreciate the value of their silver seven per cent. So that, if all coins were made everywhere of the same weight and fineness at once, although we would be right to-day there is nothing

to prevent our being wrong to-morrow. Therefore, all we can do, for our own interest, is to decimalise our own currency.

"I have the honour to be,
"Very respectfully,
"WM. BROWN.

"Francis Shand, Esq., President of the
"Liverpool Chamber of Commerce."

Home Correspondence.

CHRONOMETERS.

SIR,—I really thought we had done with Mr. Loseby and his chronometers. Last July he determined to retire from the controversy which he had raised, because he found that "Mr. Denison's object was to misrepresent everything connected with the subject." I thought that resolution a very wise one, and your declaration not less so—that it was no use to continue the discussion.

It appears, however, that what he really meant was, that he should go and try his luck somewhere else, where I was not likely to follow him; for, exactly at this time, I find that he got another batch of his memorials to the Admiralty moved for and printed at the public expense, including a long answer to that letter of Mr. Dent's which he was so unpleasantly surprised to find served up with his previous batch last December, and a new edition of the old Frodsham, Bennett, and Vulliamy nonsense about the Great Exhibition, for which Mr. Dent used to thank them as a very capital advertisement, and by which the Admiralty could not fail to be convinced of the excellence of Loseby's chronometers.

Nevertheless, the Admiralty dish was again unpalatable, and again contained something more than he reckoned on. So now he comes back here again, and, under the pretence of not having had a full enough abstract given of his lecture of last May, gets you to reprint it, for the purpose of exhibiting another proof of his superiority, which he had kept comparatively in the background in the former discussion; and this, too, after he has had this very paper published at full length, pictures and all, in the Admiralty documents.

His argument then was, that the superiority of his compensation-balance to all others was proved by the published results of the Greenwich trials; and his various tables to illustrate this excellence were exhibited at his lecture, and afterwards published here and elsewhere. It was shown, in answer to him, that the Greenwich lists really tell just the opposite story when properly examined, so as to distinguish the errors of compensation from those due to other causes. He now, therefore, goes to work another way, and professes to demonstrate mathematically that none of the inventions which preceded his *can* succeed, because they are all founded on erroneous principles, and that Mr. Dent's is the worst of them all; that being the one which he is quite right in considering it most important for him to demolish if he can. As to the others, he tells the Admiralty that experience has proved the failure of all that class of inventions, for which Mr. Eiffe got a reward, and Mr. Molyneux a patent, as Mr. Loseby himself has the latter article which, however, he finds to differ very essentially from the former (a fact worth notice in various points of view) Mr. Airy tells them, in reply, that he is altogether mistaken. If Mr. Eiffe has anything more to say to him, I daresay he is able to fight his own battle.

Mr. Dent is no longer here to fight his. And as Mr. Loseby is pleased to designate me his "professional advocate," with the usual compliments, he will not be surprised at my not deserting Mr. Dent's cause; for though he is himself dead, he has left behind him the inventions whose defence Mr. Loseby has compelled me to undertake. Neither Mr. Dent nor I ever wrote a word against his chronometers until he set to work to attack us—Mr. Dent for being successful, and me for protecting him against the schemes of Mr. Loseby and his friends. Indeed, so far as I am concerned, I had said even more than turned out to be correct, in favour of Mr. Loseby's chronometers. It seems he has not yet learned sufficiently that he had better have been content, and left us both alone.

The first thing that occurs to me to remark upon his present statement, that Dent's compensation is founded on a false hypothesis as to the actual behaviour of chronometers under ordinary circumstances, is—that, if so, Mr. Airy made a most astonishing blunder in reporting to the Admiralty, seven years ago, after some of these inventions had been under his examination for several years, that he "saw no reason why at least one of them (Dent's) should not answer quite as well as Loseby's;" and this too, when he was reporting that Loseby's did answer (which nobody denies); but that the thing had been already done by several other people, patented twice, and paid for by the Government, when it really was a new invention. If there were nothing more to be said, I think this would be tolerably conclusive, both against Mr. Loseby's demonstration of the fallacy of Mr. Dent's hypothesis and his own claim to be distinguished from the many other inventors of compensation balances, earlier and later than himself.

But there is great deal more. Will Mr. Loseby be so good as to extend his proof a little further, and explain how it is that, according to the published classification of the Greenwich trials, which he accepts and appeals to, though I do not, for this purpose, his chronometers have frequently been run so close by this good-for-nothing invention of Mr. Dent's? This very year, 1853, Dent and Loseby came out actually next to each other; in 1852, Dent was next but one to him; and the same in 1850; and in 1847, Dent was third, while he was only seventh. Nay, even the errors of Dent's chronometers are enough to refute his proposition; for whereas he asserts that Dent's secondary compensation cannot produce 1-10th of the required effect, it appears that in some years those chronometers would have stood higher than they did, but for the fact that the secondary compensation had done *too much;* or (as Mr. Airy said in another case) "had reversed the usual error, thus showing that he possessed complete control over it."

Under these circumstances, it would be a mere waste of time and paper to enter into any detailed examination on Mr. Loseby's mode of proving the impossibility of Mr. Dent's chronometers doing what they profess. But even these results, distinctly as they contradict Mr. Loseby's case, are far short of the real truth as between him and Mr. Dent. I am not going to repeat what I said last June, about the proper mode of comparing the chronometers, so as to bring out the errors of compensation distinguished as far as possible from the other sources of error, depending either on defects of workmanship or or unknown causes. But the necessity of making this distinction will be manifest from this one fact, that differences, sometimes of ten seconds and more, very frequently of six or seven, appear in the rates of the best chronometers for different weeks of very nearly the same temperature. It is evident that those are not errors of compensation, and that any inferences as to the value of the different kinds of compensation must be fallacious, unless some means are taken to eliminate as far as possible such large errors which have nothing to do with it. And it is equally evident that, notwithstanding Mr. Loseby's opinion to the contrary, there is still plenty of room for the improvement of chronometers in other respects, independent of compensation.

For the purpose of making this distinction, Mr. Dent suggested a division of the six months of trial into *equal* periods of cold, mean, and hot temperature, the weeks being already arranged in the order of temperature in one of the pages of the Greenwich lists. Mr. Loseby denounced this as unfair, because some weeks of moderate temperature were

thereby included in the periods of extreme temperature. I showed in one of my former letters, what indeed requires no demonstration, that that did not signify, so long as there was no extreme temperature included in the middle period. But I added that, as he did not like an equal division, I had no objection to his excluding mean temperature weeks more completely from the extreme periods, by taking a mean period twice as long as either of the extremes; but that he would find such a division only made the result still more in favour of Mr. Dent and against himself. And now, in order to show still more clearly that the proof of the superiority of Mr. Dent's compensation to his does not depend, as he suggests, upon any arbitrary rule invented for the purpose, I will offer him yet a third mode of comparison, and one depending on no numerical rule at all; and that is, to make the division into the cold, mean, and hot periods, wherever the register of the temperature shows that the greatest breaks actually occurred, only taking care to get a sufficient number of weeks in each period to give a fair average of the going of the chronometers in that kind of temperature.

To prevent any mistake about the matter, I will state, more fully than either Mr. Dent or I have done before: that it depends upon which of those three modes of comparison is adopted, whether Mr. Loseby can be made out to have been first even once, not merely in the four years to which Mr. Dent extended his examination, but in the last seven years—and indeed more, if it was worth while to go further back, that whichever of the three methods you adopt, Mr. Dent has been three times first within the same period; and Mr. Eiffe, Mr. Lister, and Mr. Massey, each once, and, according to the method of equal division of the periods, Mr. Lawson; but whether he or Mr. Loseby is to have the credit of being first in 1851, depends (as I said just now) upon which division is adopted; and moreover, that he has been two or three times beaten by Mr. Poole, who was second on those occasions to Dent or one of the others.

I think every one of Mr. Loseby's propositions is now sufficiently and finally answered; and that, however successful he may generally be in preparing a chronometer for annual trial, as a matter of workmanship, there is not the slightest foundation for his claim to have invented a better method of compensation for temperature than several that had been invented and at work before his was ever heard of; and that instead of Mr. Dent's being one of the worst that has been tried, it is decidedly the best.

Yours faithfully,
E. B. DENISON.

Doncaster, 26th Dec., 1853.

GROWTH AND PREPARATION OF FLAX.

SIR,—The subject of the growth and preparation of the *Linum-Usitatissimum*, or, as we call it, the raw flax plant, or line stumps, is one in which I have taken great interest, and in the introduction of which I have spent much time and money; and I consider it is of very great importance, both to the agricultural and the commercial interests of this country, as well as of her colonies. I am not a theoretical or scientific man, but what I am now about to state is the result of actual experience.

Whether the growth of flax is injurious to the soil or not, has been a much disputed point, but experience enables me to assert, that where the crop has been taken in a fair rotation, and not as a stolen crop—where the land has been properly chosen and prepared for it, and care taken that its preceding and succeeding crops do not extract the same substance from the soil, it has been found, from the very nature of the preparation required, to be advantageous in lieu of injurious. Whether the growth of flax is remunerative to the producer, among other crops, is also a disputed point, but again experience shows me that, if the growth be properly attended to, it will be found to be amply remunerative. I believe that the farmers would find it pay them, even if the stumps were wasted as refuse, by consuming the seed and bolls in feeding their stock; but if in addition to this they can find a market for the stumps, so much the better. When we consider that we are annually sending millions of money out of this country for that which we can produce at home,—that it would take the produce of at least 500,000 to 600,000 acres beyond what are under cultivation for flax in the United Kingdom, to supply the wants of our linen manufacture, and that this supply may be obtained without displacing any other crop, it does seem strange that the growth makes so little progress throughout the country. Prejudice,—that great obstacle to progress, especially in agriculture,—is a primary cause; prevention by the landlord, another; ignorance of how to treat the crop, another; want of spirit and enterprise, another; but the great cause, in most parts, is the want of a ready market for the crop in its raw state. I am satisfied that, as a general principle, where an article can be produced to advantage, if you provide a ready means of disposing of that article on or near the spot, (which is essential when the article is of the bulky nature of flax), then it will, as a natural consequence, be produced. As a means of providing these markets, I would recommend the establishment of retteries and scutch mills in different districts, and that one, two, or more parties should subscribe capital to establish a place on proper principles, to be a model for others, and where foremen might be trained up. The want of this is, to my mind, one great drawback to the Royal Society for the Promotion of the Growth of Flax in Ireland, for it is of no use promoting the growth of flax without you provide a market for it when grown, and in the system as carried out in Ireland, the farmer does not get justice done him in his flax. Besides this the monied man requires practical evidence of the profitable result before he will invest his money.

There is much dispute as to the best means of preparing flax. Some propose the dry system, but this I entirely put aside, as simply impracticable. Some state that fermentation must be the process; others that maceration is the way. Now, practice teaches me that fermentation must be resorted to as a general rule, but that for some flaxes, for certain purposes, maceration will do very well. By fermentation I mean the process of allowing the glutinous matter, which attaches the fibre to the boom, gradually to work off, like wort in ale or wine, as in Schenck's plan. By maceration I mean a violent process of immediate dissolution of the same glutinous matter, such as in Watt's plan. In most of the various novel modes which have of late been brought forward, it is evident that the inventors are theoretical and not practical men; and as for those who profess to turn flax into a substance resembling, and suitable for purposes belonging to, cotton, wool, &c., I can only say that, when we have too much flax for flax-purposes, then it will be time to try and use it for other purposes; but, until that occurs, I, for one, shall continue to direct my attention only to provide an easy, economical, and workable system for producing from the flax straw, according to its quality, an article ready of sale to, and suitable for, the flax spinners and manufacturers.

Line stumps, when pulled towards the end of July or during the month of August, should be saved on the Courtrai system. (a) When thus saved, if the buyer buy the whole crop, let it be at once carried to his sheds, where he rolls off the bolls and seed, and sells the best as seed, crushing up the bolls and worst seed to re-sell to the farmer for feeding purposes. If, on the contrary, the buyer purchase the line stumps alone, the farmer must at once proceed carefully to take off the bolls and seed,

(a) I may here state that the notion that saving the seed of flax is injurious to the fibre, fails when tested by practical experience. Properly managed, an equal quantity and quality of fibre may be produced from line stumps with the seed saved, as can be obtained by sacrificing the seed; and, therefore, what folly it is to waste this very valuable part of the crop.

keeping the stumps as even and straight as possible delivering them then to the buyer at his sheds. In either case the buyer pays cash down for the article on receiving it in good order and condition at his works. The next process is that of retting (rotting) in vats by fermentation or maceration, by which the fibre is rendered easily detachable from the boom. Great care is required here, for if the flax receive too mild treatment, or, on the contrary, too severe a treatment, it is equally complained of by the spinner. Next comes the drying. This has been and is in most cases now done out of doors, and, being dependent on the weather, is a very precarious process. Of late a mode of expressing the water from the stumps after leaving the vats, by which they are partly dried, has been introduced, and it is found that the article may be artificially dried to advantage. The stumps, being dried, are next broken by machinery, that is, the boom is broken to render the separation from the fibre more easy. This being done, they are scutched, or, by means of machinery, the fibre is separated from the boom. That which is long is called flax, the shorter fibres are called tow. It is now sold to the spinner for cash, so that the whole business is a cash business.

I have now given you an outline of the successive stages of the process of retting and scutching flax, and you will see that, with so many manipulations of so bulky an article as line stumps, great care and judgment must be used, and that the aim and object should be to invent plans by which fewer manipulations may be required. As one step in this direction I have taken out a patent for a machine which, after the stumps come out of the vats, is intended to wash, squeeze, dry, and break, in one continuous process, thus rendering sure that which is now so uncertain, besides materially reducing the labour required, and consequently the expense. I have no hesitation in saying that, with capital invested of about £10,000, one ton of flax per diem may be produced; or the produce of from 1,000 to 1,200 English acres, which will not cost, including cost of material at a fair remunerative price to the farmer, rent, rates, taxes, interest, wear and tear, &c., &c., more than at the outside £35, and that it will readily sell at from £50 to £100, according to quality. From this a calculation may be made either way; but allowing such a rettery to be established in the centre of a circle twenty miles in diameter, throughout our agricultural counties, what incalculable good must result, especially if we cast our eyes abroad at the present time, and see that there is a probability of one great source of our supply in flax being cut off. However, such retteries will not be established till some spirited monied party or parties set the example in a proper manner, and all I can do is, where I have an opportunity, to urge it. I believe your Society has practical improvement in all ways as its object; and should there be, as there must be, men wishful to promote the question of flax-growing and preparing, they cannot employ their money more profitably or to a greater public good. Will you draw the attention of your scientific chemists to the fact that whoever can discover the means of dissolving the broken shove or boom, which adheres to the scutching-tow, and thus renders it nearly useless, without injuring the fibre, will confer a great benefit, and moreover may count on making a rapid fortune.

Your most obedient servant,

Selby. G. A. CATOR.

PETTITT'S FISHERIES GUANO.

SIR,—May I request you to correct your report of one observation of mine on the 21st of December, with reference to Mr. Lawes. I said, and I am of opinion, that "This gentleman's observations on agriculture I would be content to receive with considerable respect; but that I would recommend those on manure-making to be received '*cum grano salis*,' as Mr. Lawes is a very great and fortunate manufacturer of super-phosphate of lime, and therefore lays perhaps a little too much stress on the paucity of that ingredient in Mr. Pettitt's guano."

As to the name, were we to give up that of guano to please Mr. Lawes, we should perhaps displease some one else, but this is a trifling matter. The manure will be of no greater or less value whatever name it bear.

Mr. Pettitt may claim, justly, I think, to be allowed to sell as much water in 100 tons of his manure as is sold in 100 tons of Peruvian guano or ordinary British manures; and this will at least go some way towards saving part of the chemical moisture which was dried out in the analysed specimens; and if ten per cent. more of water be left in the manure, the necessary reduction of ten per cent. in the value will still leave good money's worth in the article to the extent of 8*l*. 13s. 6d. per ton, taking the mean of the submitted specimens.

Mr. Lawes was in error, as he will have seen, by supposing that Mr. Pettitt was going to propose to introduce a new and cheaper source of nitrogen. There appears rather to be a probability that guano will rise in price, and other nitrogenous compounds *pari passu*. Any person who entered upon the manufacture of fish manures on a large scale would naturally get as much for it as it would fetch, and the reason why the estimated price of the fish guano was taken at 7*l*. a ton, was to prevent any person from arguing that it was over-estimated. A mere glance, however, will show any one that there is a considerable difference between 7*l*. and 8*l*. 13s. 6d., and that beyond all doubt a few favourable results from its application would establish Pettitt's manure at a price nearer the latter than the former.

As for the great supply question, I regret the time did not allow of my reading some of the evidence collected on the subject. My convictions on the point, corroborated by the opinion of competent persons whom I have consulted are so strong, that, low as I have estimated the average cost of raw material, I am compelled to confess that, if driven into a corner, I should be obliged to say I think it could sometimes be got for much less.

I have met with several gentlemen, on the other hand, who were disposed to raise the estimated price a sovereign for every ten shillings I reduce it. But, generally speaking, these persons have not had time, opportunities, let alone inclination, to spend as many hours in the search after facts bearing on the case, as I and some others have weeks. I shall, and I am sure Mr. Pettitt will, feel obliged by any hints or advice from those members of your body or of your affiliated Societies who may feel an interest in the subject.

I am, Sir, your obedient servant,

HORACE GREEN.

145, Upper Thames street, London, Dec. 27, 1853.

FISHERIES GUANO.

SIR,—As a listener to the discussion on Mr. Pettitt's Fish Guano Paper at your Society's House on Wednesday night, I venture to trouble you with a suggestion which I dare say will not be thrown away, as this matter is not one to be summarily dismissed from further consideration on the mere bare statement of one party that there is fish enough, and of another that such is not the case.

I should suggest, then, that your Society should communicate one or two questions, bearing on the subject, to such of the societies in union (if any there are in such a position) as may be situated in maritime towns, and request communications on the subject, which I feel sure would be readily furnished, as also by members of your Society whose vicinity to the coasts, or whose occupations bring them into communication with fishermen.

I have felt enough interested in the subject to take such steps for myself, and have already received a conclusive statement affirming the fact, a great supply of fish being procurable at a nominal price on the French side of the Channel.

I shall soon, I believe, receive a report from the coast of Suffolk and Essex, and shall communicate the result to you, if agreeable. I received a pamphlet in the room, containing a resumé of evidence on the subject, which does not appear to have been read at the meeting. As I do not doubt that the documents there printed were bonâ fide, I confess they give me an idea that there is a greater quantity of valuable matter than some of the speakers seemed to imagine.

I am, Sir, your most obedient servant,
THOMAS HART.

King William-st. City, 27th Dec. 1853.

Proceedings of Institutions.

NEWARK.—The seventeenth annual meeting of the Mechanics' Institution was held on Thursday the 2nd inst. Mr. W. N. Nicholson, Vice-President, in the chair. The business of the meeting commenced by the Secretary, Mr. Buzzard, reading the report, which was unanimously adopted. From this it appeared, that during the past twelve months the improved position of the Institution had been steadily maintained. The abstract of accounts showed that, after the payment of all liabilities, there remained a balance in the hands of the treasurer of 63*l.* 6s. 7d. The Institution now numbers 246 members, of these 54 were annual, 178 quarterly, and 14 juvenile, The library has received, during the past year, an augmentation of 145 vols., and the whole stock of books has undergone a careful examination. A Catalogue will shortly be issued. In conformity with a suggestion contained in last year's report, an effort was made, in the early part of the present year, to establish elementary classes for reading, writing and arithmetic. The attempt was as successful as could have been anticipated, and steps are about to be taken for their re-organization. The newsroom continues to be a valuable adjunct. It is well supplied with papers, and, in a pecuniary point of view, is advantageous. During the past year only one lecture has been delivered to the members of the Institution, namely, that given by E. H. Vernon, Esq., M.P. After the passing of the usual votes of thanks, it was proposed by Mr. Greenside, seconded by Mr. Newton, and resolved, that a debating society should be established. Mr. Newton subsequently proposed that 25*l.*, from the balance of the general fund, should be devoted as the nucleus of a building fund for a lecture-room. This proposal was agreed to. Mr. Paling, the curator, in adverting to the history of the past year, thought that the chief cause which had retarded the progress of the museum was the want of a suitable room for the deposit of articles, as very little money was required for the purchase or exchange of minerals, fossils, and other objects of natural history, many members having gratuitously offered a variety. He strongly urged that the suggestion of the Society of Arts, for an interchange of specimens of manufactures and natural history, should be fully carried out. Newark could produce specimens of sulphate of lime, gypsum or plaster, in all its varieties, and also a considerable quantity of fossils from the Lias and lower oolitic formations. Mr. Paling then exhibited to the meeting some very fine specimens of the fossils, &c., which had been collected by himself and Mr. Buzzard during the past year, and were intended to be presented to the Institution, whenever a suitable place was provided for the purpose. A special vote of thanks was unanimously given to Messrs. Paling and Buzzard for their services. The following gentlemen were declared duly elected to serve on the Committee during the ensuing year—the Rev. H. Bacon, Rev. J. Waterworth, Messrs. W. Bousfield, F. Buck, C. Baily, W. Hall, W. Newton, G. Chew, C. Ridge. W. N. Nicholson, J. Wright, M. March, F. Barton, J. Crossley, E. Bousfield, C. Esberger, E. Greenep, T. Mackenzie, E. Marshall, S. Pocklington, R. Richardson, J. Taylor, W. Corden, W. Cubley. Officers—Curator, Mr. W. Paling; Treasurer, Mr. R. Warwick; Secretary, Mr. J. Buzzard.

SOUTHAMPTON.—The concluding lecture of the first part of the 25th session of the Polytechnic Institution was delivered on Wednesday evening, by the Rev. J. Scotland, M.A., on the "Spirit of Enterprise," which was defined to be a separate and independent principle, the mainspring of all great movements, and, when associated with moral attributes, such as scrupulous integrity, punctuality, and indomitable perseverance, it is the means by which the mightiest and noblest objects are achieved. The subject was appositely illustrated by the lives of celebrated men, as Columbus, Wilberforce,—our good and patriotic Alfred the Great, whose memory has been embalmed in the admiration and affection of all succeeding generations of his countrymen—and that prince of philanthropists, John Howard.

STAMFORD AND PETERBOROUGH.—Mr. Robert Scott Burn, member of the Society of Arts, recently delivered his lecture on "Sanitary Science as applied to House Construction and Conveniences" to the members of the Institutions in these places. The following is the syllabus of the lecture:—Introduction.—Present state and future prospects of the Science, its importance to the community; Connection between defective Sanitary precautions and the extension of disease; Costliness of want of Sanitary arrangements; All preventible Deaths entail a pecuniary loss upon the Survivors. Practical subjects to be discussed. Site and Position.—Prevention of Damp; Drainage of Site. Sewerage Drainage.—Importance of good Drainage as a preventative of Disease; Brief exposition of the principles regulating the practice of House Drainage; Appliances in connection with House Drains, Traps, Ventilation of Drains, &c., &c. Supply of Water.—Plans adopted by the Ancients to ensure a good supply to their Cities; Comparison of these with the defective supply to the Towns in Great Britain; Impurities of Water; Chemical; Organic; Methods of Purifying, Filtration, &c., &c. Ventilation.—Brief exposition of its Theory; Application to the Ventilation of Dwelling Houses; Different methods of supplying fresh air to apartments; Different methods of withdrawing detrimental air; General remarks on the arrangement of apartments in Dwelling Houses and of various appliance to ensure, as far as obtainable by constructive arrangements, 'Healthy Homes' for all classes. Concluding Observations.—Connection between Physical and Moral Degradation; Amelioration of Physical Condition of the Labouring Classes, the great economic feature of the age, must precede all other remedial measures; The duty of the more fortunate classes of society to remove from amongst us so much Physical and Moral Degradation." It will be remembered that it was announced in the Journal in October last, that Mr. Burn was willing to deliver his lecture free of all charge whatever, save and except that he would leave it for circumstances to decide as to whether he would make a claim for travelling expenses, in cases where the institutions were not notoriously poor. In consequence of this announcement Mr. Burn has arranged to visit the principal towns of England and Scotland, and is still quite ready to extend his engagements. The Council of the Society of Arts would urge upon Institutions the importance of endeavouring to obtain influential and numerous audiences, and of giving to the townspeople, as well as to the members, the privilege of attendance, as was the case at Peterborough. It is obvious that Mr. Burn's efforts will be useless unless seconded by the institutions themselves. The subject is one of such pressing importance, on which nearly all of us require to be informed, that it is hoped these few remarks will lead to the endeavours which are being made to extend a proper knowledge of the subject, being fully appreciated and responded to.

Miscellanea.

Substitute for Coffee.—Asparagus, according to Liebig, contains, in common with tea and coffee, a principle which he calls "Taurine," and which, by the way, he considers essential to the health of all who do not take strong exercise. Reading this led me to think that asparagus might be made a good substitute for coffee. The young shoots which I first prepared were not agreeable, having an alkaline flavour. I then tried the ripe seeds; these, roasted and ground, make a full-flavoured coffee, not easily distinguishable from fine Mocha. The seeds are easily freed from the berries by drying them in a cool oven, and then rubbing them on a sieve.—*Correspondent of the Gardener's Chronicle.*

Wilkins' New Telegraph.—This telegraph is in many respects similar to Morse's, the one chiefly used in America. In Morse's telegraph the message is printed upon a ribbon of thin tissue paper, both by the instrument sending it and by that by which it is received. This paper ribbon is unwound by a clock work apparatus from a reel, and passes between a needle and a wheel covered with carbonized paper, such as is used for manifold writing. When, therefore, the operator touches a spring the needle of both instruments is brought in contact with the ribbon, and makes either a dot or a stroke, according as the touch is instantaneous only, or as it is continued for a short time. The alphabet is, of course, formed by different combinations of these dots and strokes. As by this plan a copy of the message remains in the hands of the sender, he can tell whether it has been correctly transmitted, and thus the expense, the trouble, and delay of "repeating" is avoided. In Mr. Wilkins' telegraph, the needle presses continuously on the paper, and therefore as soon as the moving apparatus is set in motion, it traces a straight line upon the paper ribbon. By means of two springs he causes a divergence of the needle to the extent of an eighth of an inch to the right and left; and the alphabet is thus formed by a series of strokes and zigzags. The advantages claimed for it are greater simplicity, freedom from error, and rapidity. It is also said that a far less number of clerks would be necessary. In addition to this, great advantages are anticipated from a new method of insulating the wire, for one only will be necessary.

Crystal Palace.—Some interesting experiments have recently been made with respect to the power required by an organ to fill the building, and a report has been presented to the directors on the subject. As the central transept alone covers a larger area than is occupied by the cathedral at York, some idea of the vast size and power of an instrument which should be heard in all parts of the building may be formed. The committee report that the area required for the instrument would not be less than 5,400 feet, the depth of the organ 50 feet, and its altitude from the ground 140 feet. The cost would not be less than £25,000, and its construction would extend over a period of three years.

Prevention of Smoke.—The Portsmouth correspondent of the "Times" states that a method for the prevention of smoke, invented by Mr. Prideaux, has been tested in the Royal Dockyard, and has been found successful. No alteration will be required either in the furnace or the boiler, and the apparatus may be fitted to the largest vessel in her Majesty's navy in 48 hours. Each furnace will require a new furnace-door, to which must be fitted Mr. Prideaux's invention. This consists of a gradually self-closing valve, of a peculiar arrangement, and of a very simple character, insuring intense heating and minute subdivision of the air in its passage through it. To indicate in some measure the perfection of the arrangement for transferring the heat radiated from the furnace to the entering air, the backs of the hands were placed on the front of the furnace door, when it was found that they could be kept there for an indefinite period, while the fire within was at an intense heat. The experiment was performed with north-country coal, which, from the large quantity of smoke it produces, offers the severest test of the capabilities of the apparatus.

Paris Exhibition of 1855.—The "Moniteur" publishes a decree appointing a commission of superintendence of the universal exposition of the products of agriculture, of industry, and of the fine arts, to open in Paris on the 1st of May, 1855. The president is Prince Napoleon; the number of members 37, among whom are MM. Baroche, Blanqui, Delacroix, Charles Dupin, Dumas, Dollfus, Ingres, Michel Chevalier, Count de Morny, Sallandrouze, Duke de Mouchy, Visconti, &c. The commission is divided into two sections—one of industry, the other of the fine arts. A special decree appoints Lord Cowley a member of the commission.

Woollen Exports.—The Board of Trade, through their statistical secretary (Mr. A. W. Fonblanque), acting upon a suggestion of the Bradford Chamber of Commerce, have written, among others, to the Leeds Chamber of Commerce, stating that, a change in the classification of woollen manufactures being under the consideration of the Board, the opinion of the Leeds Chamber was requested upon the following new form of classification:—1. Woollen goods, comprehending all goods of which either the warp or the weft, or both, are woollen—pieces and value. 2. Worsted goods, comprehending all goods of which either the warp or the weft, or both, are worsted—pieces and value. 3. Flannels—yards and value. 4. Carpets—viz., carpets and druggets made of wool; carpets composed of wool mixed with cotton, linen, or other material—yards and value. 5. Blankets—pairs and value. 6. Shawls, wollen or worsted—number and value. 7. Hosiery, woollen or worsted—viz., stockings and other articles—dozens and value. 8. Small wares and articles, woollen or worsted, not properly falling under any of the foregoing heads—value. 9. Yarn, woollen or worsted—pounds and value. The subject is now under the consideration of a committee of the Leeds Chamber of Commerce.

MEETINGS FOR THE ENSUING WEEK.

Mon. Actuaries, 7.—Mr. Charles Jellicoe, "On the Rates of Mortality prevailing amongst the Male and Female Lives Assured in the Eagle Insurance Company."
Entomological, 8. 1.—Mr. W. C. Hewitson, "Descriptions of Butterflies presented to the Entomological Society, by T. J. Stevens, of Bogota." 2. Dr. J. Davy, "On the Excrement of Insects, with reference to its Chemical Qualities." 3. Mr. J. J. Baly, "A Monograph of the Chrysomelidæ of Australia." 4. Mr. W. Varney, "On the Habits of various Insects."

Tues. Royal Inst., 3.—Professor Faraday, "On Voltaic Electricity."
Pathological, 8. Election.

Wed. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Geological, 8.

Thurs. Royal Inst., 3.—Professor Faraday, "On Voltaic Electricity."
Zoological, 3.
London Inst., 7.—Mr. T. A. Malone, "On Photography."
Photographic, 8.

Fri. Architectural Inst., 4.
Botanical, 8.
Architectural Assoc., 8.

Sat. London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany."
Royal Inst., 3.—Professor Faraday, "On Voltaic Electricity."
Medical, 8.
Asiatic, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, 23rd *December*, 1853.]

Dated 5th October, 1853.

2276. W. Crofts, Derby terrace, Nottingham park—Figuring in weaving.

Dated 6th October, 1853.

2290. C. A. Holm, 21, Cecil street, Strand—Machinery for raising and propelling fluids.

Dated 19th October, 1853.

2406. G. Gidley, 43, Robert street, Hoxton, and J. B. Muschamp, Claremont house, Kensington—Making India rubber solution.

Dated 24th October, 1853.

2452. E. J. M. Archdeacon, Gravel lane, Southwark—Indicating places, &c., in directories.

Dated 27th October, 1853.

2486. G. E. Dering, Lockleys, Hertfordshire—Galvanic batteries.

Dated 21st November, 1853.

2706. W. Joyce, and T. Meacham, Greenwich—Marine steam engines.

Dated 22nd November, 1853.

2701. W. Mee, Leicester—Braces.

Dated 3rd December, 1853.

2813. C. E. Green, 13, Blandford street, Portman square, and J. Bayliss, 34, Parliament street—Machinery for saving life and property from fire, etc.

2815. C. Buck, Wellington, Somersetshire—Retarding and stopping wheel carriages.
2817. J. and J. E. S. Gwynne, Essex wharf, Strand—Manufacture of fuel, etc., and application to reduction of ores, etc. (Partly a communication.)

Dated 5th December, 1853.

2821. B. Skillman, Crosby hall chambers—Preparing sheets of paper for postal communication.
2823. M. A. Muir, Glasgow—Check and fancy weaving.
2825. T. Storey, Phœnix foundry, Lancaster—Apparatus for sewers.

Dated 6th December, 1853.

2829. J. C. Haddan, Chelsea—Cartridges.
2831. A. E. L. Bellford, 16, Castle street, Holborn—Tartaric acid. (A communication.)
2833. T. Miles, Leicester—Lined gloves.
2835. R. C. Witty, 1, Portland place, Wandsworth road—Boiler and other furnaces.
2837. J. Bernard, 15, Regent street—Machinery for stitching, etc.
2839. A. V. Newton, 66, Chancery lane—Fire arms. (A communication.)

Dated 7th December, 1853.

2840. W. Slater, and R. Halliwell, Bolton le Moors—Spinning machinery.
2841. L. H. Bates, Bradford—Machinery for stamping and cutting metal nuts, etc.
2843. J. Getty, Liverpool—Plating of iron ships, etc.

Dated 8th December, 1853.

2844. W. G. Reeve, Elizabeth street, Eaton square—Appendage to horse shoes, avoiding necessity for roughing.
2845. W. B. Adams, 1, Adam street, Adelphi—Railway wheels, their axles and boxes.
2846. W. T. Henley, St. John street road—Electric telegraphs.
2848. B. Solomons, Albemarle street, Piccadilly—Telescopes for measurement of distance.
2849. W. C. Jay, Regent street—Cloak.
2850. J. Goddard, and C. Yates, Tottenham court road—Machinery for motive power.
2851. J. Robinson, Denton mill, Carlisle—Corn and other mills.
2852. J. Nelson, and D. Boyd, Selby—Scutching flax, etc.
2853. J. Beall, Effingham place, Cheshunt—Applying sand to railways.
2854. W. E. Newton, 66, Chancery lane—Machinery for drilling, &c., rocks, &c. (A communication.)
2855. Dr. P. J. T. Bordone, Paris—Extracting and treating juice of beet-root, &c.
2856. M. G. Laverdet, Paris—Photographic pictures.
2857. B. Murgatroyd, Bradford—Washing and scouring wool, &c.

Dated 9th December, 1853.

2860. A. James, Redditch, Worcestershire—Counting, measuring, and weighing needles, &c.
2861. D. Christie and J. Cullen, Bromley, High street—Atmospheric counterbalance slide valve.
2862. A. Shanks, 6, Robert street, Adelphi—Instrument for measuring weights and pressures.
2863. C. Mackenzie, Bayswater, and Dr. A. Turnbull, Manchester square—Machinery for paring fruit and vegetables. (A communication.)
2864. J. Winspear, Liverpool—Coating metals, wood, &c.
2865. R. Eccles, Wigan; J. Mason, Rochdale; and L. Kaberry, Rochdale—Slubbing and roving frames.
2866. J. Sutcliffe, Manchester—Steam engines.
2867. F. Osbourn, Aldersgate-street—Distribution of manure.
2869. J. H. Johnson, 47, Lincoln's inn fields—Portable cases for provisions. (A communication.)
2870. G. Morley, Birmingham—Ornamenting japanned goods.
2871. W. Schaeffer, Stanhope street—Purifying spirit.
2872. J. Bourne, Port Glasgow—Steam engines.
2873. J. Bourne, Port Glasgow—Machinery for production of iron ships, &c.
2874. J. Bourne, Port Glasgow—Construction of iron ships.
2875. H. Bessemer, Baxter-house, Old St. Pancras road—Railway axles and breaks.

Dated 10th December, 1853.

2876. A. Macpherson, Brussels—Disinfecting sewers, and converting contents to useful purposes.
2877. W. Muir, Britannia Works, Manchester—Machinery for cutting out garments.
2878. C. Coates, Sunnyside, Rawtenstall—Looms.
2881. J. H. Johnson, 47, Lincoln's inn fields—Furnaces for steel. (A communication.)
2882. E. Green, Wakefield—Boilers and furnaces.
2883. N. V. Guibert, Paris, and 4, South street, Finsbury—Forge hammers.
2884. W. Thoneley, Clayton West, Yorkshire—Woven fabrics.

Dated December 12th, 1853.

2885. E. O. W. Whitehouse, Brighton—Telegraphs.
2886. T. Hollinsworth, Winwick, Warrington—Railway breaks.
2887. W. Evans, Myrtle street, Hoxton—Motive power.

Dated December 13th, 1853.

2888. W. Redgrave, Croxley green, Rickmansworth—Safety travelling cap.
2889. G. K. Hannay, Ulverstone—Composition grinding wheels, etc.
2890. J. Wansbrough, The Grove, Guildford street, Southwark—Waterproof fabrics.
2891. W. F. Plummer, St. Mary's Overy wharf—Machinery for grinding or crushing, etc.
2892. C. Schiele, North Moor Foundry, Oldham—Preventing oscillation in engines, etc.
2893. A. G. Guesdron, Montmartre, Paris—Producing plans in relievo.

Dated December 14th, 1853.

2896. F. A. Gatty, and E. Kopp, Accrington—Printing and dyeing cotton, etc.
2898. E. Beanes, 57, Charlotte street, Portland place—Manufacture of sugar.
2900. B. Fullwood, 23, Abbey street, Bermondsey—Manufacture of cement.
2902. R. J. N. King, Exeter—Artificial bait for fish.
2904. W. B. Johnson, Manchester—Machinery for making bricks, etc.

WEEKLY LIST OF PATENTS SEALED.

Sealed December 21st, 1853.

1401. Robert Booty Cousens, of Halliford street, Islington—Improvements in the manufacture of casks or wooden vessels.
1521. John Henry Noon, of Salisbury street, Portman market—Improved method of stopping railway trains, and preventing railway accidents.
1527. Noel Natalis du Chastaingt, of Paris—Improvement in bread making.
1635. Thomas Kestell, of the Strand—Improvements in walking stick umbrellas, applicable also to parasols.
1781. William Woods Cook, of Bolton—Improvements in the manufacture of woven fabrics and in the apparatus employed therein.
2039. Gage Stickney, of Hanover street, Pimlico—Improved construction of blower. (A communication.)
2040. Gage Stickney, of Hanover street, Pimlico—Improved machinery for forging metals. (A communication.)
2392. Capper Pass, of Bedminster—Improvements in the manufacture and refining of copper.
2438. James Greenbank, and Samuel Pilkington, of Whitnell, Lancashire—Improvements in machinery for spinning cotton and other fibrous substances.

Sealed December 23rd, 1853.

181. Andrew Edmund Brae, of Leeds—Method of communicating signals from one part of a railway train to another.
1531. Peter Armand Le Comte de Fontaine Moreau, of 4, South street, Finsbury—New distilling apparatus. (A communication.)
1544. John Lyle, of Glasgow—Improvements in the manufacture of figured or ornamental fabrics.
1546. Leon Valls, of Paris—Improvements in the production of printing surfaces. (A communication.)
1547. Daniel Illingworth, Alfred Illingworth, and Henry Illingworth, of Bradford, Yorkshire—Improvements in machinery or apparatus for combing wool, cotton, flax, silk, and other fibrous substances.
1669. William Needham, of Smallbury green, and James Kite, jun., of Lambeth—Improvements in machinery and apparatus for expressing liquid or moisture from substances.
1676. Robert Smith Bartleet, of Redditch—Improvements in the manufacture of sewing needles.
1767. John Knowles, of Manchester—Certain improvements in looms for weaving.
1857. George Parsons, of West Lambrook—Improvements in steam engines and boilers.
1896. John Clegg Boond, of Manchester—Certain improvements in Jacquard apparatus.
2216. William Prior Sharp, John Hill the younger, and William Martin, all of Manchester—Improvements in machinery for spinning and doubling cotton and other fibrous substances.
2508. Joseph Haley, of Manchester—Improvements in machinery or apparatus for cutting, boring, and shaping metals and other substances.

Sealed December 24th, 1853.

1548. Antoine Audraud, of Paris—Certain improvements in railways and locomotives running thereon, which improvements facilitate the ascension of steep inclines.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Dec. 22	3542	Apparatus to retain Venetian Blinds at any required elevation	Henry Barlow and John Kay	9, Bloom Street, Salford. 356, Rochdale Road, Manchester.
" 22	3543	A Stand or Framing for Grindstones	Charles Meinig	103, Leadenhall Street.

Journal of the Society of Arts.

FRIDAY, JANUARY 6, 1854.

MEETING OF COUNCIL.

WEDNESDAY, JANUARY 4, 1854.

At a Meeting of Council held on the 4th inst., the following Institutions were taken into Union:—

324. Belturbet, Literary and Scientific Society.
325. Bolton, Mechanics' Institution.
326. Cirencester, Literary, Scientific and Mechanics' Institution.
327. Nailsworth, Literary and Mechanics' Institute.

STRIKES AND LOOK-OUTS.

The Council of the Society for the encouragement of Arts, Manufactures, and Commerce, having had the recent disputes between employers and employed in the manufacturing districts under their serious consideration, are of opinion that this Society may be made, in some degree, instrumental in promoting a clear knowledge of the facts and principles involved in the questions at issue, and may offer a neutral ground upon which both parties may fairly and temperately discuss the best modes of either preventing the outbreak of such disastrous quarrels, or terminating them as speedily and satisfactorily as possible to all parties, when they arise.

The Council, therefore, propose, in the first place, to hold a Conference, to which they will invite the General Associations of masters and operatives at Manchester, and the Local Associations of masters and operatives at Preston, to send each a representative. They also propose to invite to the Conference an equal number of those who took the most prominent part on either side of the late dispute among the mechanical engineers. It will further be the care of the Council to bring to the Conference, without bias on one side or other, as many as possible of those who, without being involved in the labour question as partisans, have studied and mastered its various bearings. The Council propose to regulate the order of the proceedings so that they may have a practical tendency, and a business character, and not degenerate into vague, noisy, or useless declamation. For this purpose, each speaker will be strictly limited to a few minutes on each topic; and, that digression may be readily checked, the whole subject will be defined and divided into distinct propositions, such as the following:—

1. Combinations. — Are they objectionable, whether set on foot by employers or employed, as a means of influencing the value of labour? Would a law of limited liability in partnerships tend to render such combinations unnecessary? Do they remove the questions with which they deal from the privacy of ordinary trade management, and place them under public cognizance, and, if so, how may that publicity be most simply and effectually secured? Ought any legislative provision, or other arrangement, to be made by which the right of association, if obviously exercised to the detriment of the community, might be controlled or neutralised?

2. Strikes and Lockouts. — Should partial strikes, intended to take the masters of a locality in detail, be met by lockouts? What other means are likely to be effectual in terminating them?

3. Wages.—Does payment by piece-work alter substantially the nature of the relations which would exist between employer and employed were the latter day or weekly labourers? Can lists of prices for piece-work be equitably drawn up so as to meet the varied circumstances of different machinery, different management, different localities, and the constant progress of improvement? Ought manufacturers to bind together their associations within the limits of a minimum scale of prices for piece-work? Ought the operative to share beyond the market value of his labour in the increased productiveness of improved machinery?

The Council propose that no resolutions should be adopted except where entire unanimity prevails. While they venture, for convenience sake, to prescribe the order of the proceedings, they intend to observe a strict neutrality. They have fixed upon Tuesday, the 24th day of January, for holding the Conference, which is hereby convened at the Society's House, John-street, Adelphi, punctually at 10 A.M.

PREVENTION OF SMOKE.

The Secretary has received several communications in reference to the discussions which have taken place at the Society's Meetings on this subject. One correspondent, signing himself "Veritas," complains that at the extraordinary meeting held on Monday, the 19th ult., in consequence of the irregular manner in which the proceedings were conducted, "one speaker interrupting another, others adverting in the most unblushing manner to their own particular schemes to the exclusion of all others," practical men would not risk their credit and experience in such a field of discussion. He then refers to Mr. Fraser's paper, and says, that he considers it was well calculated to elicit a discussion of a character likely to be of sound public service; but, he proceeds, "it must be borne in mind, that Mr. Fraser's paper only professed to give the account of his experience, as he modestly stated, in the hope that other gentlemen would also give to the Society, and thereby to the public, the result of their experience and operations in the same field of inquiry." His letter concludes with the following passage:—"It appears pretty clear, that the most certain methods at present known for effectually consuming smoke, as well as those most under control, are the furnaces known as Jucke's, Hazeldine's, and Hall's; for this you have evidence and opinions formed by practical experience of Professor Brande, Mr. Fraser, Mr. G. F. Wilson and Mr. Siemens. It probably will remain only to be ascertained which of these three contrivances can be erected at the least first cost, and require the least

expenditure in repair; this point decided, the public will follow quickly in the adoption of the most simple and the least expensive method. But the discussions at the Society of Arts ought to ascertain, and to bring this point prominently before the whole mass of the inquiring public; that the truth may be arrived at, in order the better to enable those who have not time or opportunity to search and inquire, but who will be required sooner or later compulsorily to meet the requirements of Lord Palmerston and the Government."

Another correspondent, Mr. Henry W. Reveley, "does not think that even an Act of Parliament for the prevention of smoke will have any tendency to remove this crying evil [the smoke cloud]. By far the largest portion of the London smoke is the result of imperfect combustion in our household fires; the factories and steam-engines, with the exception of sundry local nuisances, having little to do with it." Neither does he think it possible "to remove or lessen this nuisance by any patented expedient, for it is the direct interest of the patentee to make his invention as expensive and complicated as possible, in the first place for profit, and, in the second, for the purpose of obtaining security from piracy." In fact, he sees no remedy that might tend to remove or mitigate this opprobrium of London, "unless it be by some system of taxation, as recommended by Mr. W. Bridges Adams." He differs, however, from that gentleman in the mode, because "the imposition of a new tax is unpleasant, whereas, a remission of some portion of the house, or other more appropriate duty, in all cases where the chimney tops of any building or factory never emitted any black smoke, would be hailed with delight. By the same rule, I would remit all duties upon coke brought to London, as well as upon every other kind of non-producing-smoke fuel, but even with such fuel it must be constantly borne in mind, that a badly-constructed furnace, or chimney, throws out much greater quantities of deleterious gas than one of a good construction."

A third correspondent, Mr. J. E. D. Miller, states that "he was employed for some time in making and fixing the three smoke-consumers spoken of by Mr. G. F. Wilson in his letter [Jucke's, Hazeldine's, and Hall's], and having also carefully noted their working, I feel qualified to state that I consider that the best of the three, and, indeed, that the best furnace now in use is Mr. Hazeldine's. I have no interest whatever in either of the furnaces, but having had so many opportunities of seeing them at work, I well know the capabilities of each. In point of keeping in repair, also, I wish to mention that Mr. Jucke's has, in several cases, been thrown out of use, in consequence of the great expense required in keeping it in working order; and, in places where the most favourable circumstances existed, the repairs have cost double that of Mr. Hazeldine's, whilst that of Mr. Hall's, with the boiler protector, has been a source of endless expense." He further says, that "I know most of the plans before the public, and I believe it will be found that Mr. Lee Stevens's, and all the plans for admitting air, either hot or cold, before or behind the bridge, will, if they consume the smoke, consume the boiler also."

The last communication is from Mr. B. Beard, who refers to the grate invented by Mr. Cutler, one of which he himself has had in use for sixteen or eighteen winters, and the principle involved in which he thinks would be found easy and effectual, "when applied to the immense quantities of coal usually consumed in large manufactories, breweries, &c." He considers that all private dwelling-houses should be compelled to prevent smoke, as well as manufactories. He believes that it would be possible "to catch and secure all and every part of the smoke," and convert it into useful and profitable marketable products. This he proposes to accomplish by substituting for the present chimneys and chimney-stacks a series of ducts, leading to one main duct, in each street, in connection with a central depot and works where the smoke might be turned to useful account.

EDUCATION, AS A SCIENCE AND AN ART.

By M. A. Garvey.

A paper on the above-named subject cannot be out of place in this Journal. The Society of which it is the organ was established for the encouragement of arts, manufactures, and commerce, and in no way can it more effectually promote these objects than by lending its aid to the general advancement of education. The practical effect of education, when rightly conducted, is to extend the operation, and to augment the energy of mind, which is itself the prime mover and regulator of all human achievements; to increase the efficiency of the only instrumentality man possesses for accomplishing the intelligent purposes of his being. By encouraging education, therefore, the Society assists in cultivating the very soil from which springs every rational enterprise; in arousing the spirit that inspires all invention, and animates every department of art and industry.

We propose to consider this subject entirely apart from the vexed questions, whether social or political, with which it has been mixed up.

Our object will be to ascertain, if possible, the true scientific principles of education, and from them to deduce the maxims of the practical art by which the mind may be trained to the full development of its powers.

Education implies two things—the development of the mind, and the communication of knowledge.

The term education is sometimes limited to the former, whilst the latter is discriminated from it by the term instruction. Care must be taken lest in using these words we fall into the mistake of supposing that their significations are opposed to, or in any respect incompatible with, each other; and this is the more necessary that several writers on the subject have chosen to contrast education with instruction, as if the latter were an empirical substitute for the former. Now, a very brief consideration of the matter will show, that these terms are in reality but names given to one and the same process as viewed in different lights, and that it is utterly impossible to imagine either of them taking place without the other.

The mind like the body is subject to the general law which makes vigour and development consequent upon exercise; but the mind exercises itself in thinking and feeling; to assert, therefore, that it can be exercised and developed without the communication of knowledge, is to assert that it can think without objects of thought, and feel without knowing the causes of its emotions. The converse of this is equally true; for if the inculcation of knowledge excite the mind to activity, that activity must, in accordance with the general law, be followed by a corresponding development of the powers exercised. It appears, therefore, that the mind cannot be developed without acquiring knowledge, and that knowledge cannot be imparted to it without producing development.

The formal proof of a position so obvious may by many be deemed unnecessary; but when we consider how essential a clear conception of it is to the right comprehension of the whole subject, we must feel that it cannot be too firmly established. For, first, it places the two terms "development" and "instruction" in their proper light, as strictly correlative to each other, thus clearing the question of every embarrassment likely to arise from mere verbal distinctions and contrasts between them; and, secondly, it follows immediately from this correlation, as a necessary consequence, that the teacher can have no means of affecting the mind, or even of approaching it, except the very means by which he communicates knowledge, and, therefore, that the utmost perfection of his art can do no more than enable him to present knowledge to the mind in such forms and by such methods as shall affect all its powers and susceptibilities, so as to excite them to active and healthful exercise.

What these forms and methods should be is, then, the great practical question, and its solution depends upon our

ascertaining previously what is the true scope and measure of mental development.

The human mind, like all other living portions of the creation with which we are acquainted, has its period of growth, and since in its present condition, at least, its growth as well as theirs is limited by its relations to the rest of the material universe, it must therefore have its standard of development or maturity. In other words, it is intended to occupy a definite position in the system of creation; it is endowed with the germs of all the powers and capacities necessary to its complete mastery of that position; and though they cannot operate beyond its boundaries, they may be cultivated up to all its requisitions. If we had no guide in our attempts to ascertain the limits within which the operations of the understanding are confined, we might wander for ever amongst the infinite variety of things and beings that surround us without arriving at any distinct notion as to the nature and extent of those limits; we might even lose ourselves irretrievably in the delusive regions of imagination and hypothesis.

We are not, however, left without guidance in such investigations. The Creator, in denying to man the unerring faculty of instinct, which springs into maturity at once, has richly compensated him by the gift of reason, which, though slow of growth and liable to error, may be trained to purposes as far beyond those of instinct, as the immortal and infinite are beyond the things that perish where they grow, and which, among its other marvellous properties, possesses the ability of examining the nature of its own powers, of analysing their operations, of comprehending the laws by which they are regulated, and, by the proper observation of these laws, of rising to the highest point it is permitted to attain in the scale of intelligent being.

Here, then, we have all that is necessary to direct the practical course of our inquiry. We cannot, it is true, map out the province of the understanding and assign its boundaries, but we can ascertain the nature of its powers and capacities, and the laws which govern its operations, and from these infer the subjects it is fit to explore and comprehend. "We may," in the language of Mr. Locke, "know the length of our line, though with it we cannot fathom all the depths of the ocean of knowledge."

It is not necessary to our subject to attempt a demonstration of the immaterial or spiritual nature of the mind. We can know nothing of mind any more than we can of matter, except so far as we are affected by the properties of either. What the substrata may be in which these properties inhere will probably remain for ever beyond our cognisance; the fact that the attributes of mind do not at all resemble, nor bear even the remotest analogy to those of matter, is sufficient meanwhile to justify us in concluding that the essential nature of the two is totally different. Without pursuing this subject further, we will proceed at once to examine the powers and operations of the mental constitution.

It will be convenient to consider—

First—The general properties of mind; and,

Secondly—The laws which govern the conception and evolution of thought.

By the general properties of mind we mean those which are more or less concerned in all its operations. There is one such property so fundamentally important that it may be regarded as the root from which all the others spring. It is the tendency of the mind to fall again with greater facility into any state in which it existed previously. In order to avoid the repetition of this long description, we have taken the liberty of coining a phrase to indicate its import, and will therefore designate this tendency of the mind as the Iterative Principle.

The importance of this principle in an educational point of view cannot be over-estimated. It is one with the nature and conditions of which every teacher should be thoroughly familiar, we shall therefore endeavour to give as perspicuous an explanation of it as our space will permit

That such a tendency exists is a matter of universal experience. The schoolboy, who for the first times goes through a problem of Euclid, comprehends with difficulty the several steps by which he reaches its demonstration. He finds it easier the next time, and still more so the third time; until, by repeating the process, all difficulty vanishes; the whole chain of dependent truths which connect the conclusion with the premises is distinctly perceived, and the mere announcement of the question suggests its solution as if spontaneously. Now each step in such a demonstration is a separate state of the mind, and when these states are repeatedly renewed, the iterative principle is called into more vigorous action by such renewal, until at length it is fully awakened, and operates of itself almost without any external cause. The invariable order in which these states of mind succeed one another is owing to one of the special laws of thought to be considered afterwards; here we would simply illustrate the fact that the mind falls into these states with an accelerated facility at every successive renewal of their exciting cause. It is the same with every exercise of memory: that which is but vaguely remembered on being perceived only once, impresses itself more and more deeply upon the mind in proportion to the frequency with which it is perceived, and at last takes such hold of the memory that it is recalled without effort in nearly its original distinctness, though the object which produced the impression may be removed from us thousands of miles, or even have long since ceased to exist.

This principle pervades all the faculties and susceptibilities of the mind. Every emotion, by whatever cause excited, will be more readily excited by it a second time. Every perception will be more distinct on repetition, and even the combinations of thought which take place within the mind itself, will be revived with greater ease than they were formed at first. There are, meanwhile, certain conditions under which this tendency of the mind to repeat its states operates with increased or diminished force. The most important of these conditions may be thus stated.

The active energy of the iterative principle varies with the depth and distinctness of the impression made upon the mind.

This is a convenient formula for expressing our meaning, though its terms savour more than we could wish of physical inquiry. We would remind the reader, however, that the great difficulty of mental philosophy arises from the inadequacy of language as a medium of either exposition or analysis in the treatment of a subject so totally removed from the cognizance of the senses. Human language is entirely formed from the material and sensible phenomena of nature; it has, therefore, an almost irresistible tendency to divert the mind from the contemplation of itself, and to fix the attention upon physical objects. Nay, even when we have succeeded in checking this tendency, we are compelled to speak of mental phenomena in a figurative style, borrowed from the appearances of the material world; and hence arise much error and confusion, for we are constantly liable to forget that our language is figurative, and, by a very common process of self-deception, to take the symbol for the thing signified, thus transferring to the mind, in our reasonings, the attributes of matter. With this caution, however, and requesting the reader to be on his guard and not misunderstand the real meaning of our expressions, we proceed to the consideration of our formula.

The active energy of the iterative principle varies with the depth and distinctness of the impression made upon the mind. This helps us at once to account for the facts that some feelings take a stronger hold of the mind than others, and that the very same objects affect us differently at different times. We perceive myriads of objects and witness a variety of events every day without retaining anything more of them than a vague and indistinct remembrance of their general character. Let any of these objects or events, however, be suddenly invested with a

special interest to us, and it will so impress the memory that at the close of the day, or even after the lapse of years, we shall be able to recall all its particulars and to describe them minutely. We have said invested with a special interest, but the reader will at once perceive that the change which this phrase expresses must take place in the mind itself, and not in the object, which undergoes no alteration of its properties. The depth and distinctness of the impression depends upon the state of the mind at the instant of receiving it. The following seem to be the conditions under which the mind is most completely and indelibly impressed.

1. When it is entirely engaged in the contemplation of the object before it.

2. When that object is one, viz., when it is not of a multifarious character, for in that case it would be truly an assemblage of different objects.

If the mind be not entirely engaged in the contemplation of any given fact or object; if whilst apparently attending to it, it is in reality occupied with other thoughts and feelings, the impression made upon it by the fact or object will be necessarily slight and indistinct. We are justified by experience in stating that the force of attention is limited. That in proportion to the concentration of that force will be the depth of the impression made by the object attended to, whilst, if the power of attention be distributed over a large space, and a multiplicity of objects, the impression made by the whole will be proportionally superficial. We give an example which will be familiar to most persons. If whilst reading a book, thoughts and feelings foreign to its subject matter should arise in the mind, page after page may be perused with scarcely the faintest conception of their contents, and at the close of the chapter, the whole will have to be gone over again, and will be entirely new to the reader. Let us observe for a moment, what has taken place in this case. The reader has perceived every word, and even pronounced them mentally, therefore his mind has received the entire impression of the chapter, but his attention being wholly or partially given to other thoughts, that impression has been so slight as to have left scarcely a trace, if it have left any, upon his memory.

The unity, or, at least, the homogeneity of the object contemplated, is another condition necessary to the completeness of the impression made upon the mind. It involves, indeed, the same principles as the former condition—namely, the concentration of the attention; but it differs from it in this, that the former is subjective concentration, whilst the latter is objective. The one implies that there is no distraction in the mind itself, the other that its power is not distributed over a multiplicity of external objects. To recur to our example of the book. We have already seen that whilst the mind is occupied with other thoughts, the meaning of what is read will be but dimly perceived, if perceived at all. Let us now suppose that the attention of the reader is entirely concentrated upon the volume, and it is obvious that he will comprehend and remember its contents far more clearly if they embrace but one topic, than he could if they were of a miscellaneous character, referring to many topics of different kinds.

The first of these conditions is fulfilled when the feelings are powerfully excited by the object contemplated—strong emotion communicates an unwonted power of concentration to the mind, and occasions a corresponding distinctness of all its perceptions. The countenances of those we love or hate are instantly discerned by us from amongst a multitude who are simply indifferent to us, and the attention becomes fixed upon them to the almost total forgetfulness of the crowd around them. A trifling object, which before possessed no value in our eyes, suddenly assumes a character of importance when we are informed that it once belonged to a dearly beloved friend; we examine it with the most profound interest, and retain a vivid impression of its form and details. The desire to please an affectionate parent or teacher will often lend a charm to the weariest task of the schoolboy, and in like manner the desire of distinction or of gain will enable us to bestow our whole attention upon the driest and dreariest details, by the mastery of which we hope to obtain either fame or reward, and which, without that lively expectation, would be to us not merely indifferent, but positively revolting.

The second condition is fulfilled when the object perceived is of a novel or extraordinary character. The very novelty of it implies its isolation from other objects, and therefore its complete unity. We have examples of this in all extraordinary sensations; a strange and peculiar sound immediately impresses itself upon the mind amidst a perfect uproar of ordinary noises. The appearance of a meteor in the sky attracts all our attention from the heavenly bodies to which we are accustomed, and fixes our gaze upon itself. These are extreme cases, it is true, and we have chosen them expressly to illustrate the conditions under which the mind receives its deepest and most vivid impressions. But it must be observed, that in proportion as these conditions are more or less completely fulfilled, the impression will vary in distinctness. These represent the maximum, and the nearer we can approach it, the more perfect will be the result.

Having thus explained the nature of the iterative principle, or tendency of the mind to repeat its states, we proceed to show its fundamental importance to a proper practical comprehension of the mental constitution, and in doing so we will take the opportunity of pointing out the dependency upon it of some of the other general properties of the mind.

It is the source of consciousness of our belief in our continued identity, and of memory. We cannot here enter at any length upon the controversy concerning the relation of consciousness to the faculties of the mind, and the evidence it affords of mental identity. We must, however, glance at it briefly, in order to the further elucidation of our subject. If our previous reasoning be correct, it is manifest that the mind is modified by every impression it receives, and the nature of that modification consists in the tendency it contracts to renew that impression. The analyses which stop short at consciousness, and regard it as an elementary principle of our nature, must therefore be defective, since consciousness must be preceded by that permanent tendency of the mind to repeat the states in which it previously existed, which we have called the Iterative principle.

The theory of Dr. Reid on this subject is wholly untenable. He ranks consciousness as a distinct intellectual power, and says that its objects are "all the passions, and all the actions and operations of our own minds whilst present." But this view involves the reduplication of all our feelings, making each not only an affection of the mind, but, at the same time, making that affection the object of a mental operation distinct from itself. Now, to suppose that the mind can thus exist in two distinct states at the same instant, is obviously absurd. Besides this, Dr. Reid's theory leaves the past altogether out of view, though it is manifest that we are conscious of the past as well as of the present.

Dr. Thomas Brown, on the other hand, in combatting Dr. Reid's theory, makes our consciousness to consist merely in the feelings of the moment, and says nothing of any permanent modification of the mind as effected by the momentary feeling; "sensation," he says, "is not the object of consciousness different from itself, but a particular sensation is the consciousness of the moment." And again, "To the whole series of states of the mind then, whatever the individual momentary successive states may be, I give the name of consciousness." Here, it is evident, that Dr. Brown recognises nothing permanent as having taken place in the mind, but resolves consciousness into the whole series of fleeting states in which it has existed, each of which has passed away without leaving any trace behind, by which it may be again recognised as a state in which the mind previously

existed. "Consciousness is obviously nothing more," he says, "than the simple momentary feeling as it begins and ceases." He admits, however, that we are conscious of past feelings, and thus accounts for it:—"When we think of feelings long past, it is impossible for us not to be aware that our mind is then truly retrospective, and memory seems to me sufficient to account for the whole." Of course it is, since it involves the whole question, and if we beg it, we beg also all that it contains. But how is memory itself to be accounted for? How are we to recognise the feelings we remember, as those which we formerly experienced, if they have left no trace whatever upon the mind—no mark by which they can be identified as our own? Dr. Brown says, that it is owing to our intuitive belief in the identity of the mind, but this is really no solution of the difficulty, for even if it were correct that our belief in our own identity is intuitive, still it would remain to be explained. How is it possible for that permanent sentient substance to recognise in an instant as its own, thoughts and feelings which have flitted across it like the shadows of the clouds across the landscape, leaving as little trace of their existence behind? We think, on the contrary, that—

Our belief in our mental identity depends upon the iterative principle, and that that principle is also the foundation of memory.

It is very easy to say with Dr. Reid, that the belief in our continued identity, "is an instinctive feeling which laughs at logic, and declines the tribunal of reason," but it does nothing towards removing the difficulty with which that belief is surrounded. Nor is Dr. Brown's method more satisfactory, for he first assumes the intuitive belief in our mental identity as well as the existence of memory; and then, by means of these two assumptions, endeavours to account for consciousness. Both these philosophers, it appears to us, have stopped short too soon in their analyses. It is manifest that if the various feelings of the mind passed away and perished utterly, without leaving any trace of their existence upon the permanent sentient subject, there could be no such thing as retrospection; every feeling, whether formerly experienced or not, would be absolutely new to the mind; we should, in fact, exist merely in the present moment. The question of mental identity would never have arisen, for there would never have been any reference to the past, nor any inquiry as to whether the feelings of this moment were the same as the feelings of another moment, since there would exist no means of satisfying such inquiry—no test by which the identity of the mental affection of to-day with that of yesterday could be ascertained. Identity there might still be, no doubt, as there is in the mirror, which reflects the light from innumerable objects, yet still continues to be the same mirror; but the belief in, or consciousness of, the continued identity of the mind could not exist, the phrase would be absolutely without meaning. There would be no continuity to believe in, for there could be no conception of succession. There might be belief or consciousness of present power, but there could be none of its past exercise. The tendency of the mind to repeat its previous states, or the iterative principle furnishes a satisfactory explanation of the grounds of this belief in our continued identity, as well as of the phenomena of memory and consciousness.

Every impression made upon the mind modifies it, that is, awakens in it a tendency to fall again into the same state. The modification thus produced is greater or less, as the impression is more or less vivid. Here, then, we have a permanent trace of the existence of the feeling left upon the mind, without changing its substance or destroying its absolute identity. The question here, however, is not whether the mind continues to be absolutely the same; but how we come to believe in that sameness. If it were not itself a sentient substance, this would be an insuperable difficulty. But it is sentient, and every impression made upon it leaves, as we have seen, a special tendency to its own subsequent revival. This, then, is a permanent modification of the mind; and though it is followed and supervened by other modifications, it does not cease to exist, but continues to influence the mind, as is proved by the increased facility with which it falls again into the precise state from which the modification arose. The cumulative result of all these modifications is to the mind the evidence of its own continued identity.

The modification of a sentient substance implies its knowledge of the change which has taken place in its condition. After its first modification the mind, therefore, must believe in the change that has taken place in its condition. But this involves the belief in its condition before and after the change, that is, the belief in its own identity. After the second modification it must, in like manner, believe in the new change of condition, which involves the belief that it is the same mind which had been previously modified. Thus the belief in its own identity runs throughout all its subsequent modifications, each successive one being itself a proof that the mind which undergoes it is the same mind which had been previously modified by former impressions.

Consciousness is nothing more than this belief in our continued identity, combined with the feeling of the tendencies which remain to a revival of the various states of the mind by which it was modified, and both taken together constitute the foundation of memory. Identity, consciousness, and memory, are indeed so intimately blended, that it is impossible to discuss them separately. If we admit, without further inquiry, that memory is an ultimate and inexplicable principle of the mind, we must necessarily admit the other two, for they are involved in memory; but this method of disposing of the question leaves all its embarassments untouched, especially the grand difficulty of accounting for our recognition of a past feeling as a state in which the mind previously existed. If Dr. Brown's statement be correct, that our consciousness is nothing more than the whole series of our feelings, each of which separately existed for a moment only, and then utterly perished, without leaving behind it any trace or memorial to prove that it ever existed at all, how are we, on the revival of any such feeling, to know that we ever felt it before? What means have we of recognising it as our own? To these questions neither Dr. Reid nor Dr. Brown give any satisfactory answer. Their solution is, however, obviously essential to the very idea of memory.

The theory we have stated of successive modifications of the mind produced by a succession of its states, and consisting in its contraction of permanent tendencies to the revival of these states, appears to us to account satisfactorily for the recognition of our previous feelings as actually our own. Each of these permanent tendencies is, if we may use so gross and material a similitude, like the impression of a seal upon the substance of the mind, which nothing will accurately fit except the very object which produced it; or, to use a less material illustration, the tendency to its own revival, excited by any feeling in the mind, is a special appetency towards that particular feeling which can be satisfied by it alone and by nothing else. This furnishes the clue to all our former feelings and the tests by which we instantly recognise them as our own; it is, in short, our consciousness, and it differs from memory only as the tendency to any action differs from the action itself. Dr. Brown says that memory and consciousness are the same—"When we say that we are conscious of having done, or heard, or seen something, the consciousness in this case is precisely synonymous with memory." With great deference to such an authority, we must assert that this is not correct. We may be conscious of the absence of a remembrance, we may be conscious of a hiatus in a series of remembrances, and the tendency to the revival of the absent states of mind which are to fill the hiatus will still exist, will even increase in force till it is satisfied by the recurrence of the very states towards which it tends. Now to confound this tendency with the feelings which are its objects, would be an abuse of language as real, though not so

obvious as it would be to say that hunger and food meant one and the same thing. The iterative principle thus accounts for consciousness, identity, and memory; it is, therefore, unnecessary to have recourse to intuitive or instinctive belief for their explanation, even were it beyond doubt that there existed such a thing as intuitive belief. The existence of such belief may, however, be questioned. It implies the possession of innate ideas, for if we can believe anterior to experience, we must certainly have our knowledge of the thing believed in independently of experience. But all the instances usually given of intuitive belief suppose experience, and we may be permitted to doubt whether there be any instance conceiveable without it.

Our belief that the fire which burned us to-day will also burn us to-morrow if we come into contact with it; that the food which once satisfied the cravings of hunger, and the drink which assuaged the pain of thirst, will have a similar effect another time; these and similar facts are the examples usually adduced to illustrate that belief which we are said to possess without the inference of reason. But in each of these instances, have we not had experience as the foundation of our belief? The fire has already burned us. The food and drink have satisfied our appetites. Could we have predicted that the fire which produced a sensation of comfort at a little distance, would on touching it give us the most exquisite pain; that the particular substances which we call food and drink would allay our hunger and thirst, whilst other substances nearly resembling them, would instantly destroy us; could we have stated all these effects as sure to follow from their causes, before we had felt or perceived any of them, our belief might be rightly called intuitive; but since the belief arises after the experience, it seems to us to rest upon precisely the same grounds as our belief in any other facts whatever.

It has been shown that the active energy of the iterative principle is in proportion to the depth and vividness of the impression made upon the mind, and that the impression reaches its maximum depth and vividness when the object producing it possesses the character of unity, and when the whole attention is fixed upon it. Now it is impossible to imagine any cases in which these conditions, necessary to the completeness of the impression, and to its subsequent revival in the mind, are more perfectly fulfilled than in those cited as instances of intuitive belief. That profundity of impression which is necessary to thorough conviction, and which in other cases is the result of repeated operations of the impressing cause is here produced by a single operation. The process in both cases, however, differs only in degree, just as pressure differs from percussion. Our firm belief in anything depends upon the completeness of the impression it makes upon the mind. In the cases before us that completeness is produced at once, in other cases it is the result of the repeated recurrence of the state of mind produced by the object of belief. In both there is the requisite amount of evidence, but in the one, that evidence is concentrated into one inevitable and infallible proof, whilst in the other, it is made up of a number of proofs, each in itself feeble, but when combined producing as lasting and as firm conviction.

Let us take, for illustration, any natural phenomenon of constant occurrence—say the falling of bodies to the earth. We believe as strongly, and as immediately, that a stone thrown into the air will fall to the ground, as we do in the effects of fire or of food. There is nothing, meanwhile, which could lead us to believe *a priori*, that the stone would fall rather than ascend, yet, by repeatedly witnessing its fall we come to believe, with the most unshaken faith, that it will always descend. Now, it is obvious that if the first descent of the stone did not impress the mind with some degree of expectancy, however faint, that it would fall again if thrown up, the second descent could not excite any such expectancy, nor the third, nor the millionth. The longest induction would end in nothing, for there would be nothing in the mere repetition of the phenomenon calculated to produce established belief in its constancy, if its separate appearances had no tendency to produce the feeblest credence in its recurrence.

The knowledge of the iterative principle divests the process by which we arrive by degrees at the firm conviction we feel in the constancy of natural laws, or facts common to many particulars of all difficulty. On observing the stone fall for the first time, the mind is impressed with the fact, that is, it exists in a certain state, which includes some degree of expectancy that the stone will fall again if thrown up, but, besides this, it contracts a tendency to the renewal of that state, and falls into it a second time with greater facility; the degree of expectancy excited by the first appearance of the phenomena is now doubled, as well as the readiness of the mind to exist again in that state which includes such expectancy, and thus it goes on increasing in an accelerated ratio, as the phenomenon is repeated, until at last that which in the beginning was but a feeble expectancy, amounts to the profoundest belief of which the mind is capable.

Before we quit this part of our subject, we are anxious to direct attention to another phase of the iterative principle, and that is its influence in the formation of habits.

From what has been already stated, it will be seen that by the constant repetition of any of its states, the mind will in time acquire such a powerful tendency to fall into that state, that the slightest influence of the exciting cause will be sufficient to call it up, and that in many cases it will even arise spontaneously. Every action we perform, every thought that crosses the mind, and every emotion we feel, may, therefore be regarded as the beginning of a habit, and if that habit be never established, it is only because the state of mind which the action, the thought, or the passion indicated, was not repeated sufficiently often. From this we may learn the importance of the individual movements of our minds, not only to others, but also and chiefly to ourselves. But the perfect knowledge of that fundamental property of the mind which we have called the iterative principle, is of unspeakable importance, indeed, essential to its judicious training. It is nothing less than the knowledge of its plastic nature, without which it would be the vainest empiricism to undertake its formation to the higher and nobler ideals of intelligence and virtue.

Some further remarks will be offered on this subject after we have laid before the reader a brief exposition of the laws that govern the conception and evolution of thought, which will form the subject of our next paper.

(*To be continued.*)

ON SOAP AS A MEANS OF ART.(a)

By Ferguson Branson, M.D., Sheffield.

Several years ago, I was endeavouring to find an easy substitute for wood engraving, or rather to find out a substance more readily cut than wood, and yet sufficiently firm to allow of a cast being taken from the surface when the design was finished, to be re-produced in type metal, or by the electrotype process. After trying various substances, I at last hit upon one which at first promised success, viz., the very common substance called soap, but I found that much more skill than I possessed was required to cut the fine lines for surface printing. A very little experience with the material convinced me that, though it might not supply the place of wood for surface printing, it contained within itself the capability of being extensively applied to various useful and artistic processes in a

(a) Dr. Branson has also employed bees' wax, white wax, sealing wax, lacs, as well as other plastic bodies: and in some of these cases a heated steel knitting needle, or point, was substituted for the ivory knitting needle.—Ed.

manner hitherto unknown. Die-sinking is a tedious process, and no method of die-sinking that I am aware of admits of freedom of handling. A drawing may be executed with a hard point on a smooth piece of soap almost as readily, as freely, and in as short a time as an ordinary drawing with a lead pencil. Every touch thus produced is clear, sharp, and well defined. When the drawing is finished a cast may be taken from the surface in plaster, or, better still, by pressing the soap firmly into heated gutta percha. In gutta percha several impressions may be taken without injuring the soap, so as to admit of "proofs" being taken and corrections made—a very valuable and practical good quality in soap. It will even bear being pressed into melted sealing-wax without injury. I have never tried a sulphur mould, but I imagine an impression from the soap could easily be taken by that method. The accompanying specimens will show that from the gutta percha or plaster cast thus obtained a cast in brass, with the impression either sunk or in relief, can at once be taken. If sunk, a die is obtained capable of embossing paper or leather; if in relief, an artistic *drawing* in metal. This suggests a valuable application. The manufacturer may thus employ the most skilful artist to make the drawing on the soap, and a fac-simile of the actual touches of the artist can be reproduced in metal, paper, leather, gutta percha, or any other material capable of receiving an impression. By this means even high art can be applied in various ways—not a translation of the artist's work by another hand, as in die-sinking, but the veritable production of the artist himself. One of the specimens sent is a copy of Sir E. Landseer's "Highland Piper," a rude one, I must confess, though its rudeness does not militate against the principle involved in its production. Suppose the drawing had been made by Sir E. Landseer himself; that accomplished artist's actual drawing might have been embossed on various materials in common use, and disseminated amongst thousands, thus familiarizing the eyes of the public with high art, and giving a value to the embossed transcript which no translation by the die sinker, however skilful, could possibly give it. The raised gutta percha impression of this specimen is from the soap itself; the sunk impression is cast in gutta percha from gutta percha. The works in metal during the 14th, 15th, and 16th centuries, owe their excellence in a great degree to the combination in the same individual of artist and artisan. The metal was finished by the artist himself, who left the stamp of his genius unmistakably upon it. By the plan just explained, something like a return to this combination might be effected, and the artist would at least have the satisfaction of finding his own work accurately rendered, and not enfeebled in the translation; for the art of casting in metal has of late been so much improved, that little difference can be detected between the impression on the cast and the mould which produced it. I wish to lay particular stress upon the fact that *drawing touches* can be thus rendered, and an effect *rapidly* produced, unattainable by modelling. The larger plaster casts were taken from drawings freely made—as the appearance of the touches will prove—in common brown soap. The finer kind of soap is of course better fitted for fine work; but should the process now described be adopted by the manufacturer—and I trust it may never become the subject of any patent—soap better suited to the purpose than any now made will doubtless be specially manufactured. In proof that fine lines can be drawn upon the soap as well as broad vigorous touches, I can state that one of Rembrandt's etchings has been copied on soap, the soap pressed into gutta percha, and an electrotype taken from the gutta percha cast, from which a print has been obtained very little inferior in delicacy to the original etching. Doubtless persons engaged in manufactures will see applications of the process which I have not contemplated, and I leave it to their ingenuity to discover them. I would particularly call the attention of ornamental leather and paper manufacturers, book-binders, and, possibly, manufacturers of china, to the process, for it must be remembered that soap when made can be run into moulds of any form, so as to obtain curved as well as flat surfaces for the artist to draw upon. It has also occurred to me that it would prove a very ready and expeditious method of forming raised maps, pictures, and diagrams for the use of the blind. The manipulation is very simple. A lead pencil drawing, if required, can readily be transferred to the smoothed surface of the soap, by placing the face of the drawing on the soap and rubbing the back of the paper; every line of the drawing is then distinctly visible on the soap. The implements used are equally simple; all the specimens sent were drawn with ivory knitting-needles, and small ivory netting meshes for scooping out larger and deeper touches. The only caution necessary is to avoid under-cutting. Having felt the greatest interest in the establishment of schools of design, so well calculated to re-connect Fine Art with manufactures, it will afford me sincere gratification if the simple process now pointed out—and I trust its simplicity will be no bar to its being carefully tested—shall be in the smallest degree instrumental in accomplishing the re-union.

Sheffield, Dec. 31st, 1853.

P.S.—The date 1850 is on some of the illustrative specimens.

VENTILATION OF FARM BUILDINGS.

A short time back Mr. James D. Ferguson, of Bywell, agent of W. B. Beaumont, Esq., M.P., delivered a lecture on this subject to the members of the Hexham Farmers' Club. He commenced by remarking that the proper ventilation of farm buildings was a subject which hitherto, he feared, had not much engaged the attention of architects, for he had never observed any proper provision made in new buildings, either for the admission of pure air to, or the escape of impure air from, houses in which cattle were confined. In old farm steadings, in all countries, scarcely any plan appeared to have been observed; the various houses for cattle were, in many respects, too small in size, and bad workmanship in fitting the doors and windows, allowed the free access of fresh air at all times, while the vitiated air escaped through the thatched or tiled roof. Although direct currents of cold air should, if possible, always be avoided, yet these houses were generally much more healthy than the present close confined houses under air-tight slated roofs. In old buildings, where the roofs are covered merely with grey sandstone slates, tiles, or thatch, he recommended that, except keeping the roofs water tight, they should be allowed to remain as they are; but, in order that a good supply of fresh air might at all times be admitted in an undulating manner, air holes or vent ducts should be made through the wall behind the cattle, at say every ten or twelve feet, on each side of the entrance or outside door. Into these openings, which might be made through the wall two feet above the floor, tubes of wood or iron should be inserted, four or five inches diameter, or they might be made square, with a grating on the outside end, to prevent the ingress of rats or mice. The outside end of the tube should be made flush with the wall, when fixed in it, and its length should be five inches less than the wall's thickness, in order that a groove might be cut of that depth and width from its mouth downwards to within six inches of the floor. On this grove a thin flag or board of two inches in thickness should be fixed flush with the wall inside, and the air was admitted indirectly into the building below the end or bottom of the flag, and about six inches from the floor, by an aperture which would be five inches wide and three deep. Stables ought to be kept at a temperature of about 55° in winter, and from 60° to 65° in summer. Cow byers, however, should be kept much cooler, and therefore ought to have more

air holes or vent ducts than stables, which would allow a temperature ranging from 55° to 60°. The dung in stables and byers should be removed every morning, and a little gypsum scattered over the channel or gutter; or, what was much better, be completely flushed out with water, and then conveyed, either in an open channel or in socketed pipes, to a tank. This prevented any injurious effects from the ammonia or emanations arising from the urine, which, in close confined stables, tended greatly to destroy the eyesight as well as the health of horses.

In respect of the size of houses for the feeding of farm stock, Mr. Ferguson said, that according to the present mode of building steadings, a feeding byre or cow house for one row of cattle when tied up, should not be less in width than 18 feet within the falls, including a passage at their heads for feeding 3½ feet wide. The side walls should not be less than 10 feet in height above the floor, and ought to be made smooth with one coat of good plaster, and once at least each year should be carefully washed with hot lime, which made the atmosphere in the building sweet and healthy for the cattle confined in it. Moreover that such houses might be properly ventilated, ventilators 3 feet long by 2 feet wide, should be placed on the apex or highest part of the roof. By simply pulling a cord, the valves of these ventilators, which were fixed in a wooden box projecting above the ridge, were raised for the emission of the impure air, while at the same time, and by the same cord, the fresh air was admitted by means of air drains and chambers placed at intervals at the bottom of the building, and communicating with each other and into the external atmosphere, so as to introduce it in a diffused and undulating manner. These air chambers might be about twenty or twenty-two inches deep, by fourteen or sixteen inches square, with iron gratings over the top of them. A damper worked in a groove in this box or drain, flush with the inside of the wall; and, to the upper edge of it, a cord was attached, which passed over a pulley fixed to the wall plate of the building. The cord which opened the valves of the ventilator on the ridge of the building was made to pass over a pulley fixed to one of the spar legs of the roof, and also down to the wall plate over a second pulley, and then tied to the cord of the damper below. This cord then forming one only, hung down the wall like a bell rope, and by giving it a gentle pull, the damper was raised for the admission of fresh air below, while at the same time, the valves of the ventilator at the top were opened to allow the vitiated air to escape. A ventilator of this description, with its damper and gratings, need not cost more than from 20s. to 30s. according to size, and it was so simple in its action, that the most unintelligent boy could manage it.

Home Correspondence.

THE DECIMAL SYSTEM.

SIR,—I am equally disappointed with your correspondent, Mr. Bevan, in the results of the government committees' determination, as to proposed mode of alteration of coinage—wrongly termed "decimal coinage," as I consider that to be fairly decimal which will add collectively in tabular columns, in tenths; so that errors arising from present system of divisions—by 20, 12 and 4—is avoided, and a plain addition sum is substituted, merely requiring divisional lines, or comma points (from right to left), to mark the relative value (as shown in a column of monies on the other side. This would only involve altering the present pound value of twenty shillings (or old style) to future pound value of ten shillings (or new style), still retaining the name of "a pound," and any comparison of value ascertained by merely halving new style to equal old style; for instance, a rental of 60*l*., new style, would be the equivalent of 30*l*. old style; which would appear somewhat strange at first, until the new style, or standard pound, had impressed itself on the public mind. Again, the shilling might retain its *name*, but be of the value of *ten* pence instead of *twelve* pence, still retaining the name penny, which could be also further decimated, and called tenths; by which a minute and fair division of the penny, and its value in commodity, could be obtained, to the advantage of the poor: a half-penny would be a five-tenth piece, and might retain its name; the rest of the coins would be named accordant with their value, such as nine-tenths, three-tenths, one-tenth, &c., denoted on the new small copper coins by figures 1 to 9. No great change would thus be required; the old names being retained, and the penny slightly raised in value would be counterbalanced by advantages in the introduction of copper tenths.

The same decimal system might also be safely introduced in our standard weights and measures, all rising in ratio of advance by tenths; by which the complicated and varied weights of troy, avoirdupoise, and apothecaries' pounds, could be brought to a single uniform pound in weight, one-tenth of which would be an ounce, and any further reduction for minute weighing, below the ounce, to be by progressive tenths—of drams, scruples, or grains. The hundred weight would be 100 lbs., instead of at present 112 lbs.; and the ton would be ten hundred weight, instead of at present twenty hundred weight:—a fair and easy standard, simple and effective, would thus be obtained, and the errors and complications of the old system remedied.

Illustration of Principle:

ADDITION OF MONIES—NEW STYLE.

£	s.	d.	°	
2,	5,	6,	7	
64,	3,	5,	8	
9,	7,	2,	3	
34,	8,	1,	5	
5,	0,	2,	9	
7,	3,	4,	8	
£123,	8,	4,	0	New style of one hundred and twenty-three pounds, eight shillings and four pence—£61 9s. 4d. old style.

ADDITION OF WEIGHTS—NEW STYLE.

	Ton.	Cwt.	10ths.*	lbs.	oz.	
	6,	3,	2,	5,	9	
	4,	0,	3,	4,	3	
	5,	8,	7,	0,	6	
	3,	9,	8,	7,	0	
	8,	3,	5,	1,	4	
Total...	28,	5,	6,	9,	2	Twenty-eight tons, five hundred wt., six tenths, nine pounds, two ozs.

ADDITION OF MEASURE IN LENGTHS—NEW STYLE OF TENTHS.

Miles.	Furlongs.	Chains.	Rods.	Feet.	Inches.
5,	4,	3,	0,	8,	6
17,	2,	5,	9,	6,	5
4,	7,	8,	3,	5,	7
12,	8,	6,	0,	7,	2
40,	3,	3,	4,	8,	0

The present mile standard might be maintained; merely descending the scale by tenths—ten furlongs to a mile; ten chains to a furlong, &c.

Liquids might come under similar decimal arrangement, but would be most fairly determined, as to accuracy of quantity, in the same way as medicines—by weight, marked on the gauge or measuring vessel.

Yours, &c.,

W. AUSTIN.

27, Holywell-street, Westminster.

*Quarters are rejected, and Tenths of One Hundred weight substituted.

RUTHVEN'S PROPELLER.

SIR,—I feel gratified by the flattering manner in which "Cosmos" has, in a late number, referred to the steamer just built for the Deep Sea Fishing Association of Scotland, and by his favourable mention of me as Consulting Engineer to the Association. I may, perhaps, be allowed to correct some of the statements of "Cosmos," which are, historically, not quite consistent with the facts of the rise and progress of Mr. Ruthven and his invention.

Mr. John Ruthven was a printer in his father's office, and he gave up that occupation fifty years ago. In 1813, he obtained a patent for an improved printing-press, which has long been known as "the Ruthven press." About that time, the illustrious Watt invented a method of copying letters by rollers; when Mr. Ruthven, at the same time, constructed a press for copying letters into a book. This is now generally adopted under various forms, but Mr. Ruthven was the originator of the Copying press.

It is more than fifty-five years since Mr. Ruthven directed his attention to the propulsion of vessels by steam. In the end of the last century he made a small model boat with paddle wheels, and obtained the propelling power from the works of a watch. Since that time he has more or less directed his attention to the improvement of steam-vessel propulsion, and his views have now been worked out by his son, Morris West Ruthven. The first steam-boat he constructed larger than a model, was forty feet long, and eight feet broad; it satisfactorily proved the adaptibility of the water-jet principle for practical purposes, and he would at the time, have succeeded in getting it into general use had not the interference of the Admiralty, to whom the plan was submitted, advised perhaps by interested officials, knocked it on the head, by inducing others, who were at the time inclined to bring it forward, to abandon it.

Mr. W. Ruthven proceeded to New York, to obtain a patent for the United States, but he found that the law required that a large model should be deposited, and was engaged there in its construction for six months. He remained altogether for a year, but was unsuccessful in getting his plans taken up, *because* they had not been adopted in this country! It was in America, however, that he matured the improvements now successfully carried out at home.

Messrs. Ruthven carried their plans before the British Association, on its meeting at Edinburgh, a year or two ago; they were merely advised by the President of the Mechanical Section, Professor Robinson, to consult some scientific friend on the matter, as he pitied their sanguine hopes of success, and doubtless considered they themselves were incapable of judging of its merits. They subsequently lodged their model at the Great Exhibition, but, strange as it may appear, there is no mention, in any way, of Ruthven or his propeller in the reports of the juries.

A letter from myself appeared in a late number of the "Times," in which I have communicated the leading particulars connected with the steam-vessel now constructed with Ruthven's propeller.

Thus, Sir, I have laid before you a correct outline of the history of Ruthven's Propeller up to the present time, and of the inventor himself so far as it bears upon the invention under discussion.

I am, Sir, your obedient servant,

D. K. CLARK.

14, Adelphi terrace, London, Jan. 2, 1854.

Mr. J. Holden, of Halifax, in a letter to the "Times" on this subject, suggests—"That instead of allowing the water to enter through small holes at the bottom of the vessel, it should enter through two holes at the bows, of the same diameter as the pipes through which it is discharged, or through one hole of the same area as that of both the discharge pipes. The advantage of this plan would be an increase of speed, which I will endeavour show. As is well known, any body immersed in water is equally pressed upon in every direction by that fluid. Therefore, if a portion of that part of the bows of the vessel which is under water be removed, the pressure upon it will be removed, and will no longer counterbalance the equal and opposite pressure on the corresponding part of the stern. It will therefore communicate to the vessel a tendency to move in the direction of the bows; and this tendency will continue, in a greater or less degree, until the level of the fluid within the vessel is the same as that without it; and if the water be forced out at the discharge pipes as fast as it enters it at the bows, the tendency to motion will always be the same. If it be objected that the vessel could not so easily go astern with the water entering at the bows as at the bottom, then there might be a corresponding aperture made at the stern, with a contrivance for preventing the water entering at the bows while it entered at the stern, and the contrary. Thus, when the hole at the stern was closed, and the water entered at the bows, the greater pressure would be at the stern, and tend to force the vessel in the direction of the bows; when the hole at the bows was closed, and the water entered at the stern, the greater pressure would be at the bows, and tend to force the vessel in the direction of the stern."

Proceedings of Institutions.

LANCASTER.—On Tuesday week the Athenæum had its annual soirée, and brought its year to a close with perfect *eclat*. There was an exhibition of works of art, musical performances, and a display of sleight of hand and similar feats of manual dexterity. The proceedings were opened by Mr. E. Sharpe, the chairman of the committee, who said he would first call their attention to the extremely valuable collection of sculptures and paintings which had been most liberally placed at the disposal of the committee by Mr. Rothwell, of Foxholes. The sculptures executed in statuary marble were in the very highest style of art, and might be pronounced to be unrivalled by any similar collection in this neighbourhood, and he believed in this county. The paintings were all very excellent, and some of them of great antiquity. To Mrs. Fearenside they were also indebted for six excellent paintings—four of which were by their townsman, Linton—as well as for an admirable bronze figure, which was one of the most striking objects in the room. Mrs. Rossall had also contributed several valuable paintings and water-colour drawings. To the Reverend the Vicar they were also under obligations for two excellent portraits and some early sepia sketches; to the Rev. Colin Campbell and the Rev. T. F. Lee for large collections of rare engravings; to the Society of Arts for a collection of photographs, of which three from Vienna might be pronounced unequalled. Also to Mr. P. H. Delamotte, for another very beautiful series of 50 photographs; to Mr. Peacock for a carefully classified collection of ferns; to Mr. Charnley for an excellent assortment of ornaments in bronze and or molu; to Mr. Isaacs for a valuable collection of works in gold and silver; to Mr. Metcalfe for a beautiful display of works in china and porcelain; to Mr. Hardman, of Birmingham, for a small but extremely rich collection of vessels and candelabra, in gold and silver, inlaid with enamel and jewels, of great value, as well as works of art as on account of their intrinsic worth; Mr. Coupland had contributed an exceedingly interesting and rare collection of foreign and old English weapons—three of Eastern origin—beautifully worked and inlaid, being of great value; Mr. Seaward had contributed a few good specimens of hardware manufacture; Mr. Edmondson, a series of engravings; and Mr. Wright, of Caton, the model of a steam engine.

LIVERPOOL.—Besides private lectures on "Commercial Law" and "Practical Chemistry," the following public

lectures were delivered in the Collegiate Institution during the second half-year of 1853:—Two on the "Crystal Palace at Sydenham," by Mr. T. C. Archer; one on the "Life of St. Chrysostom," by the Rev. V. W. Ryan, M.A., Principal of the Highbury Training College; four on the "Physiology of the Mind and Infant Education," by Mr. W. H. Bainbrigge, F.R.C.S.; two on the "Moon," and two on the "Tides," by the Rev. St. Vincent Beechy, M.A.; one on "Heraldry," by the Rev. A. Hume, LL.D.; and one on "The Jews and Judaism," by the Rev. Hugh M'Neile, D.D.

LONDON.—On Wednesday evening a soirée and conversazione was held at the Mechanics' Institution, for the double purpose of celebrating its thirtieth anniversary and of rousing its friends and supporters into some new line of action, with a view to a restoration of the institution to its pristine vigour. The theatre was crowded, and the various entertainments went off with considerable *eclat*. The chair was taken by Mr. Grossmith, who opened the proceedings with a short address, after which there was a miscellaneous concert, supported by Miss Poole, Mr. Weiss, Mrs. Grosvenor, and Miss Collins. Mr. Weiss was encored in several of his songs, and the other singers received a just modicum of applause. Mr. Wilkinson accompanied tastefully on the piano, and Mr. Carte gave one of his popular solos on the flute. At the conclusion of the concert the "Wandering Minstrel" was performed by the elocution class, and the evening's entertainment terminated with a general adjournment to the refreshment-rooms, which had been tastefully decorated for the occasion.

MAIDENHEAD.—At the last General Annual Meeting of the Mechanics' Literary and Scientific Institution, a suggestion was made that it would be desirable to institute during the winter months a series of evening meetings, or reunions of the members, somewhat after the manner of the conversaziones of the learned societies of London. The committee appointed to consider the subject have recommended the adoption of the plan, and consider that it should be at the option of any individual present at such meetings to deliver a *short* lecture, or to read a *short* paper, upon any subject likely to be interesting to the majority; and that, after such delivery or reading, questions, remarks, and observations upon what had fallen from the speaker should be permitted. The first of the proposed series of reunions will take place on Tuesday evening, the 10th of January inst.

MODBURY.—The annual meeting of directors was held at the Institution on Monday last, when the following gentlemen were unanimously elected to the following offices: President. Rev. Preb. Oxenham; Vice Presidents, Rev. R. West, Mr. R. Lethbridge, Sen.; Secretary, Mr. Joseph Flashman; Treasurer, Mr. Richard Sherwell. It was also resolved that the Reading Rooms should be kept open from nine o'clock, a.m., to half-past nine, p.m., when all the periodicals and newspapers now taken in at the institution are to be regularly laid on the table for the use of the members who may now avail themselves of this boon. The members hope ere long to have access to a daily newspaper as soon as the funds of the institution will admit of the same. A vote of thanks was also unanimously given to the following gentlemen on retiring from office, J. Andrews, Esq., President; Vice Presidents, Mr. Luscombe and Mr. Foale.

SEVENOAKS.—On Thursday, Dec. 29th. 1853, Mr. C. J. Varley delivered a lecture at the Literary and Scientific Institution, on the "Theory and Practice of Illumination," illustrated by experiments, showing the relationship between light and heat, and their mutual dependence upon chemical action. Mr. Varley's experiments were very successful, and many practical hints were given in the lecture.

Miscellanea.

THE ELECTRIC LOOM.—The *Piedmontese Gazette* of the 12th ult. has an article on the electric loom recently invented by Chevalier Bonelli, and states that, on the recommendation of M. Beron, of Lyons, who had observed to him that he would meet at Lyons with great opposition to his invention owing to the difficulty of breaking through inveterate habits, Chevalier Bonelli has applied his invention to the old Jacquard loom, which thus remains, as it was before, merely suppressing the cylinder, as the cards are entirely done away with. By this means the manufacturer may realise immense advantages without any innovation in his factories.

GOVERNMENT SCHOOL OF MINES, CORNWALL.—Energetic measures are now being taken for the early establishment, on an extensive scale, of a school of mines for the county of Cornwall. An influential meeting in support of the scheme was held a few days since, and was attended by Mr. Williams, M.P., Mr. Robartes, M.P., Mr. Kendall, M.P., and many other influential gentlemen. After an animated discussion it was unanimously resolved that it was desirable that a central school for mines should be established, and that local schools in connection therewith should also be established or promoted. The following scheme, proposed by Mr. Gilbert, met with general approval:—"That schools should be established in several of the most populous mining districts, at which young men might attend, out of working hours, without interrupting their daily labour. That to encourage the formation and maintenance of such schools, grants should annually be made for books, models, drawing materials, &c., and, if necessary, towards the rent of the schoolrooms, on the conditions that the course of study should be of a suitable nature, and that the schools should always be open to inspection. That, for the purpose of encouraging the attendance of pupils, exhibitions at some higher school or college should be offered for competition at examinations to be held twice every year. If funds enough could be raised by Government assistance and otherwise, that a high central school should be established in the county, and teachers engaged, whose duty it should be, during the terms of study, to instruct exhibitioners and other pupils in geology, chemistry, including metallurgy, mathematics, geometry, and mechanics, with drawing; and, during the vacations, to hold examinations for the exhibitions, to inspect the local schools, and to give lectures illustrative of the sciences intended to be taught at the high school. If it were not found possible to establish such a high school, it was suggested that the grants might be made to the local schools. The expense, including 20 exhibitions at £15 each, was estimated at £1.000.

IRON MANUFACTURE OF GREAT BRITAIN.—Among the documents recently published, is the first part of the Report of the Commissioner of Patents. It contains among other things, a paper on the World's Exhibition, by Mr. Edward Riddle, the American Commissioner. In this many interesting facts are given. Alluding to the iron mines and manufactures of Great Britain, it is stated that the mean richness of the ores of iron in the South Wales coal basin, is estimated at 33 per cent. These are the richest ores of England, the average in the Staffordshire Districts being less than 30 per cent., and that of other districts rarely above 25. This is far below some of the ores of this country, which yield as high as 70 per cent. of pure iron. In England, every ferruginous clay stone is considered an ore of iron, when it contains more than 20 per cent. of that metal. To effect the calcination of the mineral, it is piled up in long heaps over a stratum formed of large lumps of coal. The fire is afterwards applied to the windward end of the pile, and after it has advanced a certain distance the pile is prolonged with the same material in the opposite direction. The ordinary height of such a heap is from six to seven feet, whilst its breadth at the bottom may be about fifteen or twenty feet. When the ore treated, as is not unfrequently the case, contains a large proportion of bituminous matter, it will, when once ignited, readily burn without the addition of any other material; but when it is not naturally combined with a sufficient amount of combustible ingredients, its place is supplied by the addition of a sparing mixture of small coal. Instead of this method of effecting the calcination of the ore in open heaps, it is in many localities roasted in a sort of furnace or kiln, similar to that employed for burning lime. In this case, if bituminous, the addition of any other fuel to the mineral is unnecessary; but if not in itself combustible, it is interstratified at certain regular distances, with layers, either of coal or anthracite.—*United States Mining Journal.*

LARGE IRON WAREHOUSE FOR MELBOURNE, AUSTRALIA.—There has just been completed for Messrs. Westby & Co., o

London and Melbourne, from the designs and under the inspection of Messrs. Newton and Fuller, the largest iron warehouse ever made for exportation. It is 300 feet long, by 130 feet wide, formed entirely of iron: 64 cast-iron columns support the girders, to which the roof and main ties are connected. The girders at the same time form a rain-water gutter, and conduct the water at intervals down the columns. There are six large double gates, three at each end, of corrugated galvanized iron, so formed as to slide within the building. The roof of corrugated galvanized iron, forms three bays of 43 feet each, supported by wrought iron ties and angle iron. The interior of the building will be lighted by skylights placed in the roof, formed of rough plate glass. To save colonial labour, the large foundation stones for the columns and gate posts have been prepared from the Yorkshire quarries of Messrs. Freeman and Co. Messrs. Newton and Fuller are likewise designing for the same building a large amount of steam machinery, and an iron chimney 80 feet high. The contract has been completed by Mr. John Walker, of Millwall, London.

PHOTOGRAPHIC LIGHT.—A novel application of the combustion of zinc has just been discovered by Mr. Wenham. He takes fine zinc parings or shavings, and forms them into a pellet, which, when ignited, affords a brilliant, and it is said, a steady light for photographic purposes.

WRECKS.—From the summary attached to the admiralty register of wrecks just published, we learn that the casualties in each month were as follows:—January, 126; February, 77; March, 32; April, 44; May, 41; June, 29; July, 18; August, 42; September, 85; October, 164; November, 189; December, 268—total, 1,115. Of these 464 occured on the east coast of Great Britain, 158 on the south coast, and 235 on the west coast. 128 wrecks strewed the coasts of Ireland, 5 were cast on shore at Scilly, 9 at the Channel Islands, 18 on the Orkneys and Shetland, and 18 at the Isle of Man; the remaining 80 occurred in the surrounding seas. The gales of January caused 126 casualties, as shown above; they prevailed during the whole month and the early part of February; the spring, summer, and autumn were moderate, but on the 26th October an easterly gale begun that in six days strewed the coasts with 102 wrecks. Strong breezes, and a short lull of moderate weather, were followed by gales of ordinary force at this period of the year; but on the 24th December a heavy storm from the S.W. burst over the country, and continued to the end of the year, with such violence that by the 29th there was scarcely a vessel in the neighbourhood of the British Islands left at sea—some had found safety by running into port, while of others the returns show a list of 183 casualties, of which 102 were totally wrecked, making a daily average of 30 wrecks during this awful and destructive gale. The whole loss of life during the year, as far as has been ascertained, amounts to 920.—*Life-Boat Journal.*

MEETINGS FOR THE WEEK.

MON. London Inst., 7.—Mr. J. Phillips, "On the Philosophy of Geology."
British Arch., 8.
Geographical, 8½.—1. Mr. A. Petermann, "Latest Accounts of the Mission to Central Africa."—2. Mr. T. Baines and others, "Geographical Explorations in Southern Africa."—3. Dr. E. G. Irving, "On his mission to Western Africa."

TUES. Syro-Egyptian, 7½.—1. Biographical Notice of Dr. Grotefend, of Hanover.—2. Mr. Sharpe, "On a Sculptured Slab from Khursabad, as explained by II Kings, XIX. and Psalm XLVIII.
Civil Engineers, 8.
Medical and Chirurgical, 8½.
Zoological, 9.

WED. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Literary Fund, 3.
Graphic, 8.
Arch. Assoc., 8½.
Ethnological, 8½.—1. Rev. J. W. Donaldson, "On the Scandinavian Affinities of the Ancient Etruscans."—2. Mr. J. Y. Akerman, "Notice of a remarkable Cranium found near Lausanne."
Pharmaceutical, 8½.
Roy. Soc. Literature, 8½.

THURS. London Inst., 7.—Mr. T. A. Malone, "On Photography."
Antiquaries, 8.
Royal, 8½.

FRI. Astronomical, 8.
Philological, 8.
Architectural Assoc. 8.—Class of Design.

SAT. London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany."
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, 30th December*, 1853.]

Dated 18th October, 1853.

2404. E. Rider, Coleman street—Gutta Percha. (Partly a communication.)

Dated 25th October, 1853.

2456. C. R. N. Palmer, Amwell, Hertfordshire—Accidents on railways.
2462. A. V. Newton, 66, Chancery lane—Railroad carriage axle. (A communication.)

Dated 5th November, 1853.

2576. J. Barlow, and T. Settle, Bolton-le-Moors—Power looms for weaving.

Dated 17th November, 1853.

2667. W. Underwood, Handsworth, Staffordshire—Cooking stoves.

Dated 25th November, 1853.

2741. A. A. V. S. de Montferrier, Paris, and 4, South street, Finsbury—Wheels.

Dated 8th December, 1853.

2847. T. Moran, Dublin—Accidents on railways.

Dated 9th December, 1853.

2859. P. M. Fouque, L. R. Hébert, and V. E. D. le Marneur, Paris, and 5, Laurence Pountney lane—Rudders.
2868. J. Chisholm, Holloway—Distillation of organic substances and products.

Dated 10th December, 1853.

2879. H. L. Du Bost, 62, Rue Neuve des Petits Champs, Paris—Locks and keys.

Dated 14th December, 1853.

2895. P. Grant, Manchester—Printing presses.
2897. J. A. Coffey, Providence row, Finsbury—Evaporating liquids.
2899. J. F. Kay, Dundee—Gas meters.
2901. J. Wibberley, Eagley, Bolton—Machinery, &c., for winding yarns, &c., on to spools, &c.
2903. R. Parrock, Glasgow—Coats.

Dated 15th December, 1853.

2905. E. H. Rascol. Catherine street, Strand—Gas retorts. (A communication.)
2906. S. Messenger, Birmingham—Lamps.
2907. T. Pugh, and W. Kennard, King street, Snow hill—Lock and latch spindles.
2908. J. B. Howell, and J. Shortridge, Sheffield—Tilt hammers.
2909. J. P. H. Vivien, Paris, and 16, Castle street, Holborn—Paper and pasteboard.
2910. A. E. L. Bellford, 16, Castle street, Holborn—Blasting powder. (A communication.)
2912. J. B. Pascal, Lyons, and 16, Castle street, Holborn—Motive power.
2913. F. W. Branston, Oak tree house, Clapham—Tablets, labels, &c.
2914. C. J. Morris, Kirby street, Hatton garden—Bookbinding.
2915. B. Whitaker, Brighton—Toys.
2916. A. Cochran, Kirkton bleach works, Renfrew—Starch, &c., to woven fabrics, &c.
2917. F. D. Gibory, Paris—Instruments for measuring heights and distances, and for levelling.
2918. A. B. S. Redford, Albion place, Walworth road, and T. Cloake, Saville row, Walworth road—Retarding, &c., railway carriages.

Dated 16th December, 1853.

2919. W. Binnion, Birmingham—Lamps.
2920. W. G. Whitehead, Birmingham—Hats, caps, bonnets, &c.
2921. W. Tranter, Birmingham—Fire-arms, bullets, and waddings.
2922. A. Limousin, Paris, and 5, Laurence Pountney lane—Looms for pile fabrics, etc.
2923. A. Médail, Paris, and 4, Trafalgar square—Hydraulic machine.
2924. T. Williams, South Castle street, Liverpool—Revolving pistol.
2925. T. S. Truss, Cannon street—Brakes for carriages.
2896. T. S. Truss, Cannon street—Communication between engine driver and guard.
2927. J. H. Johnson, 47, Lincoln's inn fields—Dyeing. (A communication.)
2928. J. H. Johnson, 47, Lincoln's inn fields—Treatment of wool. (A communication.)
2929. S. Norris, New Peter street, Horseferry road—Lighting and extinguishing gas lamps.
2930. S. Smith, Horton Dye Works, Bradford—Rovings and yarns of wool.
2931. A. Parkes, Birmingham—Separating silver.
2932. R. B. Hall, Whitecross street—Crushing, etc., quartz, etc.

2935. H. Thomson, Clitheroe—Machinery, etc., for stretching textile fabrics, etc.
2936. R. W. Waithman, Bentham House, York—Bands, etc., for driving machinery, etc.

Dated 17th December, 1853.

2938. J. Horton, Birmingham—Metallic vessels.
2940. C. Bedells, Leicester—Elastic fabrics.
2942. J. Greenwood, 10, Arthur street West—Preventing drafts of air into rooms, etc.
2944. M. P. Houghton, and A. Stewart, Hillmorton, Warwick—Accidents upon railways.
2946. R. Whewell, Little Bolton—Machines for cutting paper.

Dated 19th December, 1853.

2948. J. Tribelhorn, St. Gall, and Dr. P. Bolley, Aarau, Switzerland—Bleaching vegetable fibrous substances. (A communication.)
2950. W. Crossby, Devonshire street, Sheffield—Ventilation of granaries, etc., and grinding of grain, etc.
2952. R. Waygood, Newington causeway—Portable forges.

Dated 20th December, 1853.

2954. A. Paterson, Westminster—Cooking apparatus.
2956. J. L. Clark, 2 Chester villas, Canonbury park South—Insulating electric telegraph wires.
2958. P. Wagenmann, Bonn—Paraffine.
2960. E. V. F. Lemaire, 2, Rue Drouot, Paris—Tanning.
2962. J. Burrows, Haigh Foundry, Wigan—Metallic plates.

Dated 21st December, 1853.

2966. G. Boccius, Hammersmith—Breeding and rearing of fish.
2968. H. Kohnstamm, 7, Union court, Old Broad street—Imitation leather.
2970. J. Dinning, and W. Inglis, Southampton—Purifying, etc., water.
2972. J. Jones, Glasgow—Steam engine governors.

WEEKLY LIST OF PATENTS SEALED.

Sealed December 28th, 1853.

1559. Carlo Minasi, of Camden Town—Improvements in concertinas.
1561. Auguste Edouard Loradoux Bellford, of Castle-street, Holborn—Improvements in steam boilers. (A communication.)
1562. Auguste Edouard Loradoux Bellford, of Castle street, Holborn—Improvements in magneto-electro machines. (A communication.)
1564. Thomas Edward Irons, of Arbroath—Improvements in the manufacture of lasts, and in machinery connected therewith; parts of which machinery are also applicable to other like purposes of eccentric turning.
1581. William Charles Spooner, of Eling House, near Southampton—Improvements in drills for agricultural purposes.
1582. William Tasker, of the Waterloo Works, near Andover—Improvements in drills for agricultural purposes.
1598. Henry Meyer, of Manchester—Certain improvements in looms for weaving.
1609. Peter Armand le Comte de Fontaine Moreau, of South street, Finsbury—Improvements in typographical printing presses. (A communication.)
1621. Alexander Angus Croll, of Howrah House, East India road—Improvements in apparatus used in the manufacture of gas.
1625. Thomas Moss, of Gainford street, Islington—Improvements in printing bank notes, cheques, bills of exchange, and other documents requiring like security against being copied.
1899. Chandos Wren Hoskins, of Wraxhall—Improvements in the application of steam to cultivation.
1967. Benjamin Hornbuckle Hine, Anthony John Mundella, and Thomas Thompson, all of Nottingham—Improvements in machinery for the manufacture of textile and looped fabrics.
2206. Charles Edward Austin, of Rookwoods, Stroud—Improved reaping, gathering, and binding machine.
2337. Bernard Couvan, of Fenchurch street—Improvements in giving signals on railways.
2351. Richard Jones, and Charles John Jones, both of Ipswich—Improvements in fire-arms.
2358. John Thomas Way, of Holles street, Cavendish square—Improvements in making and refining sugar, and in treating saccharine fluids.
2433. James Warburton, of Addingham, York—Improvements in preparing rape-seed oil. (A communication.)
2442. John Baily, of Mount street, Grosvenor square—Invention for the cure of the croup and other diseases in fowls and poultry.
2455. Thomas Summerfield, of Birmingham—Improvements in the construction and manufacture of windows.
2460. Alfred Curtis, of Sarratt Mills, Herts, and Bryan Donkin, the younger, of Bermondsey—Improvements in machinery for cutting rags, rope, fibrous, and other substances.
2466. Charles Goodyear, of Avenue road, St. John's-wood—Improvements in the manufacture of boots and shoes.
2475. Downes Edwards, of Ravenscliffe, Isle of Man—Improvements in signal apparatus for railways.
2476. Patrick Benignus O'Neill, of Paris—Improvements in screw wrenches. (A communication.)
2496. Aristide Michel Servan, of Philpot lane—Improvements in treating *phormium tenax*, flax, and other vegetable fibrous matters.
2497. John Johnson, of Over Darwen—Improvements in looms for weaving terry and other similar fabrics.
2526. John Whitehead, and Thomas Whitehead, both of Leeds—Certain improvements in cutting-tools, and in the working of iron, brass, and other metals, and wood, and other materials.
2530. Joseph Bauer, of Prague—Invention for cultivating and digging the soil by means of a steam-digging and harrowing-machine.
2544. James Howard, of Bedford—Improvements in horse-rakes and harrows.
2545. Richard Edward Hodges, of Southampton row, Russell square—Improvements in fastening the ends of springs made of India-rubber.
2546. Charles Iles, of Peel Works, Birmingham—Improvements in metal bedsteads.
2551. Thomas Irving, of Dalton, Kirkheaton—Improvements in preparing wool for spinning.
2552. Bryan Edward Duppa, of Malmarpres Hall, Kent—Improvements in colouring photographic pictures.
2561. William Gilbert Ginty, of Manchester—Improvements in the mode of manufacturing the combustible gases resulting from the decomposition of water or steam, and in the construction of apparatus connected therewith.
2575. John Rubery, of Birmingham—Improvements in the manufacture of open caps for sticks of umbrellas and parasols.
2579. Henry Pershore, and Timothy Morris, both of Birmingham—Improvements in the deposition of metals and metallic alloys.
2587. Alfred Vincent Newton, of Chancery lane—Certain improved means for preventing the fraudulent abstraction of property. (A communication.)
2597. Thomas Dunn, of the Windsor bridge Iron Works, Pendleton, James Bowman, of Plaistow, and Joseph Dunn, of Pendleton—Improvements in machinery for raising, moving, and lowering heavy bodies.

Sealed December 29th, 1853.

1037. George Thomas Day, of Burghfield Hall, Berkshire—Improvements in travelling packages.

Sealed December 30th, 1853.

1574. Elias Robison Handcock, of Pall Mall—Certain improvements in mechanism to decrease friction in propelling machinery, and to compensate for the wear thereof, and to strengthen the driving parts.
1575. Auguste Edouard Loradoux Bellford, of Castle street, Holborn—Improvements in the construction of submarine or subaqueous tunnels or ways. (A communication.)
1608. Peter Erard, of Marseilles—Certain improvements in steam boilers.

Sealed January 2nd, 1854.

1588. John Rollinson, of Kingswinford, and William Rollinson, of Brierly hill—New or improved apparatus for preventing explosions in steam boilers.
1590. Samuel Wellman Wright, of Chalford—Improvements in machinery or apparatuses for reducing and pulverising gold and other metalliferous quartz and earths, and in separating metal therefrom.
1592. Richard Archibald Brooman, of Fleet street—Certain machinery for converting caoutchouc into circular blocks or cylinders, and for manufacturing the same into sheets. (A communication.)
1600. Decimus Julius Tripe, of Commercial road East—Improvements in locks.
1610. John Hood, and William Hood, of Glasgow—Improvements in the treatment or manufacture of ornamental fabrics.
1614. James Bradshaw, and Thomas Dawson, of Blackburn—Improved shuttle skewer.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1853. Dec. 31	3544	Improved adjustable fastening for stays, antigropelos, gaiters, and other articles of wearing apparel	Geo. Waide Reynolds & Co.	Broad street, Birmingham.
1854. Jan. 2	3545	A shot charger	Holden & Nicholas	Brook street, St. Paul's, Birmingham
"	3516	Reversible sofa bed	William Meyerstein	47, Friday street, City.

Journal of the Society of Arts.

FRIDAY, JANUARY 13, 1854.

MEETING OF COUNCIL.

WEDNESDAY, JANUARY 11, 1854.

AT a Meeting of Council held on the 11th inst., the following Committees were appointed :—

On Education as connected with Arts, Manufactures, and Commerce; consisting of Lord Ashburton, the Dean of Hereford, and Professor Moseley.

On Industrial Pathology; consisting of the Marquis of Blandford, Dr. Thomas King Chambers, Mr. J. Simon, and Mr. Thomas Twining, Jun.

STRIKES AND LOCK-OUTS.

The meeting on this subject, appointed for the 24th inst., has been postponed till MONDAY, THE 30TH, at 11 O'CLOCK PRECISELY, it having been represented to the Council that the latter day would be found more convenient generally to persons desirous of attending and taking part in this discussion.

SWINEY BEQUEST.

A meeting will be held at the Society's Rooms on Friday, the 20th of January next, at four o'clock in the afternoon, when the bequest made by the will of the late Dr. Swiney, in favour of "the author of the best published work on Jurisprudence" will be adjudged.

COLONIAL CORRESPONDENCE.

THE following despatch from the Governor-in-Chief of the Leeward Islands, detailing the steps which have been taken in St. Kitt's to co-operate and communicate with the Society of Arts, has been received from the Foreign-office :

Leeward Islands,
Antigua, Dec. 8, 1853.

MY LORD DUKE,—In accordance with the tenor of the suggestion of the Council of the Society of Arts, conveyed in your Grace's Circular Despatch of 24th April, 1852, I have the honour to acquaint your Grace that the Lieut.-Governor of St. Kitts has reported to me that a committee has been appointed by persons in that Island desiring to keep themselves in communication with that Society, consisting of Thomas Swanston, Esq., M.D., James Samuel Berridge, and James Deans Rogers, Esqrs.

I have, &c.,
(Signed) R. J. MACKINTOSH

His Grace the Duke of Newcastle.

INSTITUTE BOOK ORDERS.

The Council have much pleasure in bringing under the notice of the Institutions the following statements, showing the extent to which the arrangements with the leading publishers, for the supply of books and maps at reduced prices, under certain conditions, to institutions, has been taken advantage of. Those conditions, it will be remembered, were, that the Society of Arts should collect the Institute orders once a month,—that these orders should be sent in duplicate, one copy to be returned to the Institute and the other to be retained by the Society—that the Society's book agent would price the invoices, with a view of avoiding errors—and that the Institutes should remit to the Society the several amounts before the orders could be executed. The object in collecting the orders monthly is that they may, in some degree at least, partake of a wholesale character. Should they increase in amount it will then be seen how far it will be possible to receive and execute the orders bi-monthly. The plan came into operation in November last. The subjoined statements show that—

	In November.	In December.
No. of Institutions availing themselves of the plan ...	25	20
Full price of their orders ...	£145 15 0	£196 10 5
Reduced price of their orders	£106 6 5	£149 17 8
Total saving	£ 39 8 7	£ 46 12 9
Ditto per cent.	About 27	About 23¼

It should be stated that the reason of the difference in the average amount of discount in the two months is due to the fact of Messrs. Partridge and Oakey having withdrawn from the arrangement.

NOVEMBER ACCOUNT.

	Full Price.			*Red. Price.*		
	£	s.	d.	£	s.	d.
Aberdeen, Mechanics' Institution	11	0	8	8	7	0
Annan, Mechanics' Institute ...	9	1	6	6	15	7
Bakewell and High Peak, Institute	2	14	0	1	19	2
Barnsley, Mechanics' Institute ...	14	2	6	10	8	3
Brighton, Mechanics' Institution...	1	5	0	0	18	10
Bromsgrove, Literary and Scientific Institution	6	2	6	4	3	10
Cambridge and Cambridgeshire, Mechanics' Institute	1	15	0	1	6	8
Derby, Mechanics' Institution ...	3	16	6	2	8	4
Durham, Mechanics' Institute ...	3	19	6	2	17	4
Fordingbridge, Literary, Scientific, and Mechanics' Institute ...	2	12	0	1	18	7
Hitchin, Mechanics' Institution ...	3	1	0	2	6	2
Lincoln and Lincolnshire, Mechanics' Institution	7	0	0	5	13	10
London, Bank of England Library and Literary Association ...	6	1	0	4	9	2
Macclesfield, Useful Knowledge Society	4	10	0	3	1	5
Odiham, Mechanics' Institution ...	6	11	6	4	15	8
Saffron Walden, Literary and Scientific Institution	3	11	0	2	11	0
Sevenoaks, Literary Institution ...	8	1	0	5	4	0
Sherborne, Literary Institution ...	3	13	6	2	7	8
Southam, Mutual Improvement Society	2	8	5	1	16	4
Tiverton, Literary and Scientific Institution	10	13	6	7	19	10
Warwick, Athenæum	4	14	6	3	12	1
Wellingborough, Mechanics Institution	1	6	6	0	19	10
Wisbech, Mechanics' Institution .	9	14	6	7	0	4
Yeovil, Mutual Improvement Soc.	11	15	0	8	17	2
York, Institute of Popular Science and Literature	6	4	5	4	8	4
	£145	15	0	106	6	5

Showing a total saving of £39 8s. 7d., or a discount about 27 per cent.

DECEMBER ACCOUNT.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Accrington, Mechanics' Institution	8	3	1	6	9	5
Blairgowrie and Rattray, Mechanics' Institute	5	6	6	3	19	10
Bristol, Athenæum	4	0	0	3	14	0
East Retford, Literary and Scientific Institution	0	18	7½	0	15	4
Gateshead, Mechanics' Institution	5	1	3	4	0	4
Guernsey, Mechanics' Institution	5	8	6	4	0	7
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EDUCATION AS A SCIENCE AND AN ART.

By M. A. Garvey.

(Continued from page 118.)

Having in our last paper taken a rapid survey of the general properties of mind, including consciousness, the belief in our continued identity, memory, the principle of belief generally, and habit; and having shown that they all depend in some manner upon that fundamental tendency of the mind to exist again in the states in which it previously existed, which we have called the Iterative Principle; we proceed in the present number to review the laws which regulate the conception and evolution of thought.

All the elements of our knowledge are acquired in the first instance through the organs of sense; they are the media by which the mind maintains its correspondence with the external world. By the external world we must, however, understand not only the things that exist apart from our bodies, but also the bodily organization itself, which, however closely united to the mind, is as truly external to it as the most distant object.

The knowledge we acquire through the senses, as well as the feelings of pain or pleasure, of uneasiness or comfort, which arise from the condition of the physical frame, are equally termed sensation, and although the latter cannot be referred to any of the organs of sense, there is no doubt that, like the former, they are states of the mind that arise in consequence of certain recondite changes which take place in the nervous system. We shall take another opportunity of pointing out the important influence they exercise upon the mind, but at present our observations will be directed to the nature of the knowledge we acquire through the organs of sense.

The physical changes that take place in the organs previous to the rise of sensation in the mind, belong rather to the departments of physiology and anatomy than to mental science. It is questionable whether these changes can ever be accurately investigated unless means be discovered of observing the living organ with all its hidden machinery, in the healthful, normal discharge of its functions; but even were the whole process observed and described with the most scientific accuracy, it could give us no assistance in the investigation of the mental changes which follow it, and which do not commence until the physical process is ended. The data for such investigation must be gathered from the diligent and cautious observation of what is going on continually in our own minds.

The nature of the sensations derived through the several organs requires no description; the most ignorant man understands it better, probably, than the most profound philosopher. But the manner in which these sensations coalesce in the mind is not so generally understood, and as it is of much importance in the science of education we must dwell upon it for a moment.

The association of ideas is the name commonly given to that general law of thought by which feelings adhere together in the mind in certain orders, and according to certain relations, so that when any feeling arises, it immediately calls up those that are thus connected with it. It is necessary to bear this in mind in order to understand the true nature of sensation.

Two or more of these senses may be addressed at the same moment by one object, and the sensation in the mind will appear perfectly simple, though there can be no doubt that it is made up of the separate and different sensations derived through the several organs addressed. On account of this intimate blending of the sensations felt simultaneously, we often refer to one sense the knowledge which we really obtain through another. This takes place to a far greater extent amongst what may be called the three intellectual senses of hearing, touch, and sight, than it does in the case of taste and smell, which may be regarded as bearing a more purely animal and instinctive character. Yet, even in these, how difficult is it sometimes to separate the sensation of taste from that of odour? And how frequently do we compare them together in our minds? There are many tastes which we consider like smells, and, conversely, many odours which instantly suggest savours; though, when we reflect upon their nature, we must be aware that they bear as little real resemblance to each other as our feeling of any one property of matter does to our feeling of any other,—that they are, in fact, as different from each other as the sensation of colour is from that of sound, or of warmth.

It is in what we have called the three intellectual senses, however, that this transference of sensations to organs from which they do not immediately arise, exercises the most important influence upon our elementary acquisitions. There is nothing more common, for example, than for people to say they can see to a certain distance around them, and they would be very much astonished, if not indignant, should any one tell them that they cannot see to the distance of even an inch. And yet there is no truth in science more firmly established than the fact that longitudinal distance could never be perceived by sight, unaided by the other senses.

The sole object of sight is the light reflected from the surfaces we look at. The sensation of vision can amount, therefore, to no more than to various gradations in the feeling of colour. This is not merely a conclusion of abstract reasoning; it has been determined by experiment. Mr. Locke and Dr. Browne both mention the case of a young man who had been blind from his infancy, and was suddenly restored to sight by a surgical operation. Here the sense of sight had at first to act

entirely alone, without any aid from the other senses, and the result accords perfectly with what we have stated above. The window of the chamber in which the patient was placed opened upon an extensive and diversified landscape; but to him the whole appeared a flat surface, as if a piece of canvass had been let into the window frame, and the various objects depicted upon it with colours varying from the faintest to the most vivid; but he had no notion of perspective or of what painters call aërial distance. He considered the church steeple, which was many miles distant, and the bars of the window itself, as equally within his reach.

But it may be asked, do we not discover figure and magnitude by the eye? Whether figure enters into the sensation of vision or not is open to question. In all probability the only knowledge we receive through the eye is that of colour, though, as we have always seen colour upon surfaces which we have known to be expanded and figured, these notions have become so essentially connected with it, that it would be extremely difficult, if not impossible, to prove that it could exist without them. However this may be, it is very certain that we are indebted to other organs than the eye for our notions both of distance and magnitude, though these notions are so intimately associated or rather blent with the sensation of vision, from their constantly occurring together, that they instantly suggest, and at the same time modify, one another. The idea of the three dimensions of matter —length, breadth, and thickness,—is obtained at first from the tactual organ, and the sensations attending muscular contractions and extensions, and this idea afterwards developes itself into the notions of longitudinal and lateral distance; but these notions constantly arise at the same time with the sensation of colour; and since colour is found to fade as the coloured object recedes from the eye, its faintness becomes, by the principle of association, representative of distance; in like manner the size of bodies appears to diminish by distance, in consequence of the smaller angle of the diverging rays reflected from it, which the eye subtends, and by association diminutiveness becomes also a symbol of distance. These two facts taken together, not separately, constitute the foundation of the painter's art, so that, by smallness and faintness, he can represent distance; and nearness, by a proportionate increase of size and distinctness of colouring.

Nothing, perhaps, can give us a more striking idea of the extensive influence which this substitution of one sense for another exercises upon our conceptions, than the illusions of perspective and colour in the productions of the art just mentioned. A landscape appears to extend itself before us for many miles on every side, with all its variety of hill and dale, of plains, woods, and lakes, of churches, castles, cottages, and villages, even the distant mountains which lie far beyond our horizon, are faintly visible, lifting their blue summits to the sky, into which they seem to melt and vanish; whilst all we look upon in reality is a small surface of canvass, covered with various coloured touches by the artist's pencil. Many more examples might be adduced of this unconscious transference of sensation from organ to organ; but enough has been said to show the immense importance to the educator of a knowledge of the fact that such transferences are constantly taking place, as well as of the necessity of being able at the instant to assign to each sense the amount of knowledge it has contributed to any complex impression upon the mind. It is the surest safeguard against the deception or illusion of the senses, for in a healthy state of the organs, illusion can seldom take place as regards the peculiar sensations proper to them severally; it is only in the sensations which they represent that they are commonly deceived; and if we know the organ to which the office properly belongs of conveying to the mind that knowledge, the genuineness of which we suspect as conveyed by the representative sense, we can refer to it at once for correction or confirmation.

The impressions derived through the senses, are, as we have said, the elements of all our knowledge; and the most profound intellectual operations can effect no more than the arrangement, re-arrangement, composition, and analysis of the elements thus acquired, together with the discovery of resemblances, and analogies between them.

All these operations proceed meanwhile in accordance with certain fixed laws, to which we shall next direct our attention.

Every one who has bestowed any notice upon his own thoughts, must have observed that they arise and succeed one another in a certain order, and that the order in which they occur varies with the manner in which they were originally impressed upon the mind. These variations in the order of occurrence admit of classification according to established principles or laws of thought; and the first of these which claims our notice is briefly designated as the principle of "Contiguity in time or place."

The influence of this principle is familiar to every one in the daily experience of life; it is in fact the commonest and most extensive of all the principles by which our thoughts and feelings are associated together and with one another. A great sorrow or joy is for ever connected in the memory with the places and objects amidst which it was felt; and though the bitterness of the one or the ecstacy of the other may have long since faded from the mind, the sight of the objects which were the mute and inanimate witnesses of our emotions will revive them once more in all their original poignancy. On the same principle the events of domestic life are dated from one another in proportion to their nearness one to another, without any reference to the arbitrary eras of chronology. The mass of mankind thus recall the incidents most interesting to them as having happened before, at the same time, or immediately subsequent to some great prominent event, such as a war, a pestilence, a season of dearth, a severe winter, the death of some eminent personage, or any other occurrence of a striking and unusual character which deeply impresses the mind. The Abyssinians, after Park's visit, dated the events which occurred amongst them as having happened so many seasons after the white man passed, until, perhaps, some other incident equally unusual arose and formed a new point of departure in their reckonings. In like manner we may notice that in every family some few prominent events form the centres or nuclei around which are grouped all the minor occurrences which form the little history of the household.

Thus the mere fact that any two or more states of mind have followed one another in immediate succession, or have been produced by objects contiguous to one another in place, is sufficient to establish a permanent association between them; and this is true whatever the states of mind may be called, whether thoughts, emotions, or simple sensations. The appearance and odour of a flower will recall the high thoughts of an overruling and watchful providence with which we once contemplated the simple beauty of a similar flower, remembering that the lips of truth had proclaimed it to be more perfectly arrayed than Solomon in all his glory. The thought that impressed itself upon the mind in the perusal of a book will be associated in the memory with the place which the words that expressed it occupied upon the page, when the number of that page, the chapter, and the volume, are totally forgotten. The sound of an instrument will revive all the circumstances of a happy evening spent with friends in times gone by, when similar tones enlivened the gaiety of the party. The whole scene will rise before us: the persons who were present, the dresses they wore, the manner in which they conducted themselves, the saloon in which they were assembled, its furniture and proportions, the urbanity of the host and hostess, their condition in life and subsequent history, the acquaintances we made there, and a thousand other particulars; and each of these, should it be recalled by any circumstance, will, like the sound of the instrument, have the power of recalling all the others.

The whole system of human language depends upon

this principle of association by contiguity in time or place. We look at an object for the first time; we handle it, taste it, or smell it, and at the same time we hear a peculiar sound, which is the name of the object. The mind immediately connects that sound with the conception of the object as perceived by the other senses, and when this has been repeated sufficiently often the connexion becomes indissoluble, the sound will revive the conception, and the conception the sensation of the sound. This is unquestionably the source of oral speech. Written language stands on a different footing. The spoken word is the symbol of the mental conception; the written word is the symbol of that symbol. Hieroglyphical writing may appear an exception, but it is indeed no language at all, and consists only in rude pictorial representations, which aim at recalling the original mental effect either directly or by analogy In all tonic languages what we have stated will be found to prevail without exception.

The power and value of this mental principle are strikingly exemplified in the fact, that it can thus combine the arbitrary sounds of the human voice so intimately with the conceptions of the mind, that they shall for ever afterwards stand as indexes to these conceptions, and by their mere utterance have the power of exciting similar thoughts and feelings in the minds of others; and not only so, but afterwards cement the arbitrary vocal symbol with another symbol still more arbitrary, addressed to the sight, in such a manner that they never fail to suggest each other, as well as the thoughts and emotions of which they are the complex exponents. If novelty and strangeness were not in some measure necessary to the feeling of wonder, and that we could continue to regard things that have grown familiar to us with the feelings they would have awakened had we discovered them for the first time; some of the commonest actions of our daily life would appear to us little less than miraculous. What can be more truly marvellous, for example, than that very ordinary and humble acquirement, which enables me by tracing a few signs upon this paper, to convey to other minds the invisible and intangible thoughts that occupy my own? What incredulous astonishment would seize us if informed for the first time that, by gazing upon some black marks arranged upon a white substance we should be carried back as by a spell of some potent magic to the very beginning of time, and enabled to contemplate the infancy of the world and of our race; that we should be placed in a position from which we could survey the rise of nations which have vanished from history; see the foundations laid of cities and temples whose very ruins are sought for in vain, and mingle with the counsels of the rulers who swayed the destinies of the earliest tribes of men. That by the mere inspection of these marks our minds shall be thrown into the same strain of thought and feeling which filled the minds of men who died thousands of years before our birth; that we shall share in their joys and sympathize with their grief; that the finest shades of thought which crossed their minds shall be renewed in ours; that, in short, by this wondrous mental principle we are made partakers in the accumulated wisdom, genius, and experience of mankind.

It is not, however, in language only that its importance is exemplified; it is the essential element in every branch of human knowledge which embraces local connexions and relations of space, such as geography, topography, geology, astronomy, and all sciences depending upon sequence of time, as history, or upon process, as chemistry, medicine, and every kind of art and manufacture. The very existence of these sciences depend upon that law of thought which in the former cases enables the mind to connect together in one conception a vast number of separate objects according to their local relations, and in the latter a series of facts and events in the order of succession, or of physical operations, in the relation of cause and effect, each being in itself the effect of that which precedes it, and the cause of that which follows.

We proceed to notice the second principle of association between our thoughts, which is usually called "resemblance."

The influence of this law of the mind is also very extensive, and is felt by us all with more or less intensity. Examples in illustration of it may be drawn in abundance from all our mental processes, but our space will admit of a few only. A similarity of voice or of feature in a stranger, to a friend who has been long dead, or removed from us by distance, will instantly recall his image, as he lived and moved when present to our senses. The proportions and furniture of a room will revive a long train of joyful or sorrowful emotions experienced in one which resembled it; and the aspect of nature at different seasons of the year will renew the remembrance of speculations, studies, or occupations which engaged us at similar seasons in other years. We have classed the principles of association separately, for the sake of exposition, but it must be carefully borne in mind that they do not operate separately. They all, in fact, frequently influence our trains of thought at the same moment. Thus the principle of contiguity co-operates with that of resemblance—the faint similarity of a single object to another that formed part of a complex scene, or the revival of a feeling resembling one which arose from a long succession of events, will, like the touch of a talisman, place the whole once more before the intellectual gaze. In this principle of resemblance we have to remark, however, as regards sensation, at least, that when we discover a likeness to one object in another, it may be considered as a substitute for that which it resembles, and the feeling to which it gives rise in the mind is rather a renewed perception than a resemblance. The process that takes place is this: we see an object which resembles another; it renews the feeling which that other object first awakened; this renewed feeling instantly recalls the object by which it was originally excited, and the original object, being thus recalled, revives all the accessory thoughts and feelings with which it was associated by contiguity in time or place.

This leads us to notice the important facts, that thoughts and emotions mutually suggest each other according to the principles of association in which they originally affected the mind, and that similar feelings may be excited by causes of a different nature. It would be difficult to state verbally in what the resemblance between our feelings consists, but the fact is undoubted, as any one may convince himself by attending to the manner in which emotions arise in his own mind. The sight of unsullied snow inspires a feeling resembling that produced by the contemplation of moral purity and stainless virtue. The opening spring, with its manifold promise of the fruitfulness which is to crown the future harvest, fills the bosom with hopes of success in the various enterprises of life; and winter, presenting everywhere images of decay and death in the vegetable world, awakens in the mind corresponding feelings of sadness and gloom. The early morning when all nature is fresh and vigorous, and the gradually increasing light reveals new beauties on every side, is not only a striking emblem of childhood, but derives its emblematical character from awaking within us feelings similar to those with which we notice the unfolding of the infant powers, and are carried forward in anticipation to the contemplation of their fully developed splendour. On the same principle the falling shades of evening remind us of the decline of life; and sleep in its stillness and helplessness has been in all ages chosen as the most expressive symbol of death.

It is upon this resemblance or analogy between our emotions that the whole language of metaphor and figure depends, and a correct rhetorical style cannot be acquired without a knowledge of the mental principle upon which the resemblance or analogy is founded. The rules usually given for the formation of style, will in many cases be unintelligible without such an acquaintance with the laws of thought; but with it their meaning will be dis-

tinctly and easily comprehended. We remark further, that the suggestions of analogy between means and ends lie at the basis of invention.

If the end to be obtained be clearly understood, it will call up to the mind other ends already accomplished, together with the means by which they were effected, and these means will in turn suggest simpler and more effectual processes for accomplishing the purpose in view by the force of analogy or resemblance. In like manner, the perception of single events or facts will stimulate the mind to look for their causes, and to discover them by tracing out analogies in other effects. It was thus that Sir Isaac Newton discovered the universal law of gravitation from the fall of an apple, that the swinging of a lamp led Galileo to the discovery of the isochronic oscillations of the pendulum, and thence to the true system of the heavens. The same principle of analogy conducted Harvey, from the observation of valves opening from the heart in the arteries, and to it in the veins, to the demonstration of the circulation of the blood. This principle has, in short, been the pioneer of all great inventions and discoveries. It suggested to Columbus the existence of a new continent. Its influence is very remarkable in the discovery of printing; and, not to accumulate examples, it was the generation of a little vapour in a wine flask, barely sufficient to displace the cork, which suggested to Savery the practical employment of the mighty agency of steam to purposes which have given a new impulse to the human race if not altogether altered its destinies.

Another law of thought is that usually denominated "association by contrast," or that tendency which we all feel, on looking at any objects, or otherwise receiving an impression, immediately to think of its opposite. Passing by the strange account given of this principle by David Hume, we think it may be reduced to special resemblance. In what we call contrast it is manifest that there must be some common platform of resemblance between the most antithetical extremes, or else their comparison would have no meaning whatever. Thus, when we see a dwarf, the perception may call up the notion of a giant, but the idea of a giant is surely not the most contrary conceivable to that of the dwarf; a mountain, an ocean, or a period of time would be still more contrary, for they would not possess a single property in common with the dwarf, whereas the giant possesses all the properties of the dwarf, but in larger proportion; so also the life of the ephemeron, which is born and dies of old age in one day, may suggest the eternity of being; and the sight of a wretched criminal laden with the most heinous crimes, and led to execution amidst the execrations of his species, may bring before the mind the idea of his happy and innocent childhood, when he was an object of the tenderest care and love. Now these appear to be the very remotest contraries to each other, and yet, if we consider them more closely, we shall find that they all possess some common quality or qualities upon which the mind seizes as the ground of comparison.

In the case of the dwarf and the giant the common quality is size upon which the mind becomes intent; by reason of the extraordinary deviation of the dwarf from the common standard, associated with the general conception of man, this property of size becomes immediately the clue to other suggestions of proportion; the mind runs rapidly over the whole scale, and fixes upon the two extremes as including all intermediate degrees. One day and eternity are alike duration, but they are the extremes of brevity and continuance; and, as regards the maturity of criminal depravity, and the innocency of childhood, they are opposite states or termini of moral being, between which vice and virtue may mingle in every proportion, from the first hesitating and fearful indulgence in a forbidden course, which disturbs the calm purity of childhood, to the hardened guilt which defies all laws, human and divine, retains scarcely a single trace of what the mind once felt and reverenced, and which glories in its shame; these are, no doubt, violent extremes, but they are still the extremes of a moral condition and a responsible agency, which is obviously the only ground of comparison between them.

We shall find the explanation here given confirmed, if we examine the nature of rhetorical antithesis, which is nothing more than the utterance of the mental principle of contrast. Thus the whole life of man, from its beginning to its close, is expressed under the figures of the cradle and the grave, which mark its extremes. The variety in the circumstances and social condition of men, is included in a similar manner in the juxtaposition of their extremes; hence the common union of the terms poverty and riches, luxury and want, the palace and the cottage, the monarch and the beggar. On a similar comparison of abundance, and deficiency in some common quality, pride will suggest humility; learning, ignorance; health disease, and so on throughout all the contrasts that can be drawn between degrees of similar, not of different, qualities.

The practical uses to which this property of the mind may be educated are manifold. It may be brought to check our overweening exultation in our fortune or endowments by suggesting the condition to which we should be reduced by their removal. Like Philip of Macedon's page, it may be brought to remind us, in the midst of prosperity, that we are still men and exposed to the changes of time. But, on the other hand, it may prevent us from sinking into blank and helpless despair, however hopeless our circumstances may appear, by presenting to us the reverse of the picture, and thus exciting hope and stimulating us to those efforts which are best calculated to retrieve our circumstances. Co-operating as it does with the laws already exemplified, especially with the power of discovering and seizing upon resemblances and analogies, it is calculated to lead to inventions in science and art. It may suggest the effects likely to issue from a given cause, were its leading properties either greatly augmented or much diminished. The fire which cheers and comforts us as it burns on the hearth, may suggest on the one hand the violence of a fierce conflagration, and on the other the slow combustion which goes forward in the lungs; and as we perceive that the fire on the hearth may be extinguished by excluding the air, or by saturating it with other vapours, we discover by analogy the means by which the most violent conflagration may be instantly quelled, as well as the no less important fact that impure exhalations will poison the air we breathe, and render it unfit to sustain the vital flame that burns feebly within us.

The breadth and extent which the high cultivation of the principle of contrast gives to the mind is astonishing. The power of observation and the range of suggestion are no longer confined to mere contiguity in time or place, nor to the resemblances and analogies of what is just before us; they expand themselves over the whole scale of conceivable being, from its lowest to its most exalted forms, with all intermediate degrees. Whilst at each degree the mind is aided by the other laws of association, which give it a command over all thoughts related in place or in time, as they were originally impressed upon it, and also of all their resemblances and analogies.

The fourth and last law of association is that of abstract relations or the principle by which the mind abstracts from a number of objects some property or quality common to them all, however different they may be in other respects. The common property thus abstracted for separate consideration may be either a casual relation between the objects, but external to them, or a relation between their inherent properties. The examples of the former are the following:—Position, as when we observe a number of objects not with reference to their individual qualities, but to the place they occupy relative to one another. As in a village, for example, one house

stands on a height, another in a hollow, and a third on the level; one is nearer, another farther off, and a third still more distant, and each bears a certain relation of position to all the others. Proportion, or the feeling we have of the relation which certain numbers and quantities bear to certain other numbers and quantities. Degree, as in sounds—when one is louder, shriller, or more continued than others, and similarly in all our sensations; and comprehensions, or the relations of parts to the whole. This is Dr. Brown's classification, and though it might be simplified so as to reduce several of the foregoing divisions to one more general, yet, as it offers a convenient arrangement of the different modes of relation, we have adopted it as it stands.

The most important of the abstract relations is that between the inherent properties of objects independently of their external circumstances; and this depends upon the power which the mind possesses of discovering resemblances between them and of abstracting or withdrawing from all their other qualities those in which the similarity exists, and making them the object of its attention. Upon this mental power depends all classification, and consequently the existence of common names in languages. Without it everything in the universe would be to us simply an individual, with a proper name in which no other being would be indicated. The common names, or general terms, which express this conception of a general resemblance, enable us to indicate whole genera and species in a single word—as quadruped, horse, dog or animal, quadruped, biped; or taking the mere property of existence, being, animated, inanimate. It is this property of the mind which gives to language all its power of expression, and if we could fancy ourselves deprived of it no such thing as science would be possible, everything we knew and gave names to would exist apart from everything else in the memory.

The feeling of these abstract relations is the source of all reasoning. We desire, for example, to know the exact relation of one object to another, but we have no means of considering them together; we select, therefore, a third object, which we know bears a certain proportion to the two former, and by comparing them both with it, we are enabled to arrive at a correct estimate of their proportion or other relation to each other. This third object is what is called the middle term in logic. The comparison of the first with it is the major premise; the comparison of the second with it is the minor premise. The estimate formed of the relation between the first and second by means of this comparison with the middle term is the conclusion; and the whole process, formally set forth, is called a syllogism. The capacity of the mind to grasp these abstract relations between things and ideas, so that they form permanent ties between them in the memory, combined with the principle of association by contiguity, constitute that special law to which we referred in the previous number, in accordance with which the series of propositions which make up a mathematical demonstration arise in the mind, in the order of their regular sequence or dependency.

Many more observations suggest themselves upon this topic, but our space is almost exhausted, and we must bring our remarks to a close. The reader will have observed that we have in the foregoing pages dealt exclusively with the intellectual operations of the mind, and only adverted indirectly to the emotions. He must not infer from this that we look upon the feelings as beyond the influence of education; on the contrary, we believe that as the stimulating and exciting power of the whole mental constitution, and as the source of all our impulses to good or evil, the feelings require the most careful and delicate culture; that our moral susceptibilities and emotions are the affinities and repulsions which are intended by Infinite Wisdom to preserve us in right relations with Himself, as well as with all other beings and things, and therefore that to train them aright is of infinitely greater importance to human happiness than the most perfect intellectual discipline. We have been restrained from expatiating on this part of our subject, however, by two considerations; first, the necessity for compressing our remarks as much as possible; and secondly, the danger of touching upon any of those disputed questions which we promised at the beginning to avoid.

There are several of our emotions, meanwhile, which may be safely discussed without venturing upon debatable land, but as these will necessarily be alluded to in our future remarks upon the practical art of education, we think it needless to dwell upon them in this place.

DOMESTIC FIRES WITHOUT SMOKE.

In the Journal of Gas Lighting for the past month, Mr. Julius Jeffreys communicates to its readers a plan for clearing the atmosphere of towns from the smoke of household fires. He proposes to make the bars of the fire grate hollow, and to connect these hollow bars with a gas-pipe. The grate is filled with gas coke, and the grate bars are perforated with small holes on that side nearest to the coke they contain. The gas being turned on by means of a stop-cock in the usual way, and lighted by a match, quickly ignites the coke in the fire place, which soon becomes glowing hot, and is kept so by the small jets of flame below and in front; and a bright and cheerful fire is kept up, burning with more or less intensity as the supply of gas is increased or diminished, and it burns without smoke. This is certainly an elegant and expeditious mode of kindling a fire, and Mr. Jeffreys shows it to be by no means a costly one. It is evidently well suited for drawing-rooms and apartments where the furniture might be injured by smoky fires.

Mr. Davenport, one of the officers of the Society of Arts, has adopted a method somewhat similar to that proposed by Mr. Jeffreys, for the fires of bed-rooms, which are required to be lighted on short notice, and to burn without smoking. Mr. Davenport connects a hollow ring with the gas-pipes near the chimney, by means of a flexible tube of the ordinary kind. This hollow ring is entered between the two lower bars of the front grate, is perforated on the upper side with small holes, and the fire-place is filled with coke above the ring, which lies upon the bottom grate. The jets of gas issuing from the holes in the hollow ring being lighted ignite the coke above, and soon produce a clear and smokeless fire. The Transactions of the Society of Arts contain many valuable papers on the construction of domestic fire-places, and stoves for warming and ventilating apartments, which may be read and studied with advantage even now, although the use of coke, anthracite, and gas, has to some extent modified and superseded many of the ingenious contrivances there described.

TRANSLATION FROM THE LAST REPORT FROM THE GENERAL AGENCY OF THE IRON TRADE IN THE AUSTRIAN EMPIRE.

We announced in our last report that the consumption of iron material in England, particularly of the sorts required for railways and ship-building, had greatly increased. The same thing has also occurred in the last ten months in France, to such an extent, that by reason of the continual extension of railways, ship-building, and machine-making, the French furnaces, although remaining in work the whole year, have only partially been able to meet, from their own resources, the demands and requirements made on them. In consequence of this, the prices of French iron, which in the beginning of the year 1853 stood at:

12 francs the 100 kilos., or 2fl. 41½ kzrs. the Vienna cwt., silver currency for coke-made pig iron, and

29fr. the 100 kilos., or 6fl. 29¾ kzrs. the Vienna cwt. silver currency for bar iron taken on the spot, have now risen to:

17fr. to 18fr. the 100 kilos., or 3fl. 48½kzs. to 4fl. 2 kzrs. the Vienna cwt., for pig iron, and

34fr. to 35 the 100 kilos., or to 7fl. 37kzs. to 7fl. 50 2-5kzs. the Vienna cwt. for bar iron.

Moreover, France imported in the year 1852:

664,633,000 kilos.,	11,868,446 Vienna cwt. coal,	
2,733,000 „	448,036 „ „ coke,	from England;
1,792,155,000 „	32,002,768 Vienna cwt. coal,	
169,389,000 „	3,024,804 „ „ coke,	from Belgium;
15,002,000 „	267,893 Vienna cwt. pig iron	from England;
26,416,000 „	471,714 Vienna cwt. pig iron	from Belgium;
1,841,000 „	32,875 Vienna cwt. bar iron,	
270,000 „	4,821 „ „ steel,	from England.

Influenced by these circumstances, and it being evident that increased importations from abroad must take place to meet the development of the above-named sources of consumption; and with a view not to discourage the extension of such undertakings, the French Government suddenly resolved to reduce the import duty on both coals and iron.

(Then follows the present French tariff.)

It is therefore to be expected that, in consequence of the reduction of the import duty on steel, the exports of this article from Austria to France (which have been hitherto very small) will be largely developed, and, speculating on this, several purchases of steel have already been made in Stiermark for French account.

We think we are not wrong in looking forward to this circumstance as a compensation for the reduced exportation of steel plates from Carinthia and Stiermark, which articles during a number of years have been exported in considerable quantity by way of Trieste, particularly to the southern states of America, for the manufacture of tools, and especially of those used for mining purposes. We therefore seize the present favourable opportunity to exhort all proprietors of Austrian steel works, in their own interest, to exert themselves earnestly, and to spare no sacrifice to get possession of this newly-opened market, and to maintain it by a uniform good quality of manufacture, as well as by strict attention to instructions received. Unfortunately, in many steel-works, the late unfavourable state of things has induced an entire remodelling of the establishments. Under these circumstances an association similar to those which have produced such good effects in other countries, is much to be recommended, in order that by such means, viz., through united efforts, an export trade in steel may be secured, not to France alone, but to other countries, into which, according to the last report of prices, it may be profitably introduced to meet their increased wants.

Even our neighbour Russia has only seven steel-works, the production of which can scarcely meet her own demand.

Consequently an export of steel may be expected in that direction, rendered feasible by the reduction of duty which takes place from the beginning of 1854.

We subjoin the new Iron Tariff, dating from the 1st of January, 1854, giving at the same time the official exchange for the month of January of fifteen per cent. discount, when paid in paper money instead of silver; so that thus the import duty on 100 pound Vienna weight, paid in bank paper, may be exactly seen.

IRON.

—	Tariff in 1851.		Tariff in 1854.		Vienna cwt. in Bk. Paper.	
	fl.	krs.	fl.	krs.	fl.	krs.
a. Pig Iron ... (Zoll. *cwt.*)	0	45	0	24	0	31
by sea and Italy ...	1	0	0	36	0	46
from the Zoll. districts	0	0	0	22½	0	29
on Certificate... ...	0	0	0	15	0	19
b. Wrought Iron ...	2	30	2	30	3	13
by sea and Italy ...	3	30	3	0	3	52
from the Zoll. districts	0	0	1	0	1	17
c. Rails	3	30	2	30	3	13
from the Zoll. districts	0	0	1	0	1	17
d. Steel (tempered and untempered)	4	0	2	30	3	13
from the Zoll. districts	0	0	1	0	1	17
e. Sheet Iron	4	0	4	0	5	9
Tyres	3	30	4	0	5	9
from the Zoll. districts	0	0	1	30	1	56
f. Tinned Iron Plates ...	5	0	5	0	6	26
from the Zoll. districts	0	0	2	30	3	13
Wrought Iron, such as anchors, chains, &c. ...	5	0	5	0	6	26
from the Zoll. districts	0	0	1	30	1	56
g. Steel Wire and Instrument Strings ...	7	30	7	30	9	40
from the Zoll. districts	0	0	2	30	3	13
h. Rough Castings ...	2	0	1	30	1	56
from the Zoll. districts	0	0	0	45	0	58
a. Iron Ware, lowest quality	5	0	5	0	6	26
from Zoll. districts	0	0	3	0	3	52
b. „ Common	10	0	10	0	12	53
from Zoll. districts	0	0	3	0	3	52
c. „ Fine	15	0	15	0	19	19
from Zoll. districts	0	0	4	30	5	59
d. „ Finest	25	0	25	0	32	12
IRON WARE:—						
Iron Vessels, per ton burthen	4	0	5	0	6	26

In addition to which each cwt. is chargeable 2 kreutzers for weighing-duties, besides "Siegeltaxe," and "Zettelgeld."

Money.—60 kreutzers equal to 1 florin
10 florins silver „ £1 sterling.

Present Exchange 11¼c. to 11½ per pound sterling.

Prices of Prussian Iron in Cologne under 19th Nov. as follows, viz.:

	Thalers.		Vienna cwt. Silver Currency.
German Charcoal Pig Iron,	24	per 1000lb.	or 4fl. 10krs.
„ Coke Pig Iron	22	„	„ 3fl. 49krs.
Hoops, according to thickness	49	„	„ 8fl. 30krs.
	54	„	„ 9fl. 22krs.
Angle Iron, 3-4 at 4 inches	43	„	„ 7fl. 27krs.
Nailrods	46	„	„ 7fl. 59krs.
Tinplates	67	„	„ 11fl. 37krs.

FRENCH EXHIBITION OF 1855.

The Commission of the Universal Exhibition assembled on Saturday at the Palais Royal, under the presidency o Prince Napoleon. His Imperial Highness, after reading the decrees instituting the Commission, pointed out the programme of its labours in the following terms:—

"Gentlemen,—The Emperor confides to us a noble and honourable mission, in which France will show herself worthy of her name by the eagerness with which her artists and her manufacturers will respond to the appeal which is made to them. Our duty towards foreigners is to receive them with a liberal and friendly hospitality. All opinions in matters of political economy are represented here, not to enter on fruitless discussions, which are foreign to our mission, but to co-operate with equal ardour, whatever may be our point of view, for the success of that work which is to illustrate France and Europe of

he nineteenth century. On this point, gentlemen, we must be all agreed. The Emperor has testified his high impartiality, in assembling in the same body, the leading men in politics, sciences, arts, manufactures, and commerce. For the first time a universal exhibition of the fine arts will be added to one of industry. It belongs to our country to set the example of this alliance, which so well suits our initiatory genius. I hope, gentlemen, that the most entire confidence will preside over our relations, and I ask from you for your President that indulgence of which he stands in need. Feeling my insufficiency for the great mission which the confidence of the Emperor has confided to me, I shall at least devote to it my most ardent zeal, and a firm will to perform it well, which is the first condition of success. The questions which we shall have to solve are numerous and complicated, and are connected with a multitude of different interests. I propose to submit them successively to your decision, as they may present themselves, in order not to overburthen ourselves uselessly at the commencement of our labours. They naturally divide themselves into two great parts; those which may require decrees on the part of his Majesty, and those which we can solve on our own authority. In execution of the decree our first operation is the nomination of the Vice-President of the General Commission and of the two Vice-Presidents of the sections of Manufactures and the Fine Arts. I shall afterwards request you to give me a sub-committee to assist me in the execution of the measures which you shall have decided upon. The business can only be managed in a practical manner by a small number of persons, who shall devote to it their special aptitude and their time. The first question to be examined by that sub-committee will be the drawing up of regulations for the prompt despatch of the numerous affairs which we shall have to settle."

The Commission, and the two sections of which it is composed, then proceeded to the election of the vice-presidents. President Troplong was chosen vice-president of the General Commission, M. Baroche, vice-president of the section of the Fine Arts, and M. Billault vice-president of the section of Agriculture and Manufactures. Lord Cowley assured the Commission of the co-operation of England in this grand solemnity, of which she had furnished the first example, and congratulated himself on being called on to take part in the labours of the Commission.

Home Correspondence.

CHRONOMETERS. (a)

SIR,—I shall be happy to discuss the papers that I may have the honour to read before the Society with such of your correspondents, possessing sufficient practical knowledge of the subject to guarantee the time being profitably occupied, as may desire a candid and dispassionate inquiry. As regards the different methods of secondary compensation, it does not occur to me that any further explanation is necessary, as the constructions themselves are placed before the readers of the Journal. They have now an opportunity of forming their own opinions on the merits of the different plans, and also of ascertaining the amount of error, which the different chronometers have exhibited in the trials at the Royal Observatory, by referring to a detailed account, published in No. 29 of the Journal, in which the errors are given as they occur in the government lists. Those interested in the subject may further consult parliamentary paper No. 1,006, Session 1853, from which the following extract, contained in a report of the Astronomer Royal to the Board of Admiralty, is taken:

"In regard to the merits of Mr. Loseby's invention, there are two distinct classes of trials; first, where the special experiments have been instituted for the examination of the success of the special construction invented by Mr. Loseby; for a detailed account of these, I beg to refer to the papers which I have cited in paragraph 2, stating only at present, that I consider these experiments to have incontestably proved the success of Mr. Loseby's invention; second, when Mr. Loseby's chronometers have been tried with those of other makers, in the annual trial of chronometers at the Royal Observatory, in which trials the effects of the new invention is combined with that of general excellence in the construction of the chronometers In explanation of the following results from these trials, I must remark, that as far as 1848 inclusively, the chronometers were not severely tried, except at the express desire of the makers, but from 1849 all have been tried severely; also that I shall at present advert only to the severe trials, as the only ones pertinent to this question—

1845. Loseby's one chronometer stood first in merit.
1846. Loseby's three chronometers stood above all others.
1847. Loseby's one chronometer stood sixth.
1848. Loseby sent no chronometer for severe trial (a.)
1849. Loseby's one chronometer stood third (Eiffe's being first.)
1850. Loseby's one chronometer stood first.
1851. Loseby's one chronometer stood first.
1852. Loseby's one chronometer stood first.

I consider it therefore as placed beyond doubt that the success of Mr. Loseby's principle is proved, and that the general excellence of his chronometers is established."

With reference to Mr. Denison's letter, published in No. 58 of the Journal, I have only to observe, that a discussion continued in that style might possibly open up a new field of enterprise for briefless barristers, and advertise samples of their abilities, whilst it furnished some amusement to the members of the Society of Arts; but the substitution of personalities and other characteristics of bar advocacy, for dry facts and demonstration would not, probably, much advance either science or art.

Yours, &c.,

January 9th, 1854. E. J. LOSEBY.

(a) This must close the present discussion on chronometers.—ED.

(a) In the ordinary trial of this year, one of Loseby's chronometers stood first.

COLONIAL POSTAGE.

SIR,—May I inquire if the Association for the promotion of Cheap Postage is defunct. I have looked in vain in the recent numbers of the "Journal of the Society of Arts" for any notice of it.

I hope it may not be so, and still more. that if it be unfortunately defunct, it may be recovered, in which case I would beg to offer it a hint.

I always thought it rather complicated matters, and partially interfered with its successful working, by attempting anything beyond the regulation of that part of the matter which exclusively belonged to the Home Government. Most of the Colonies with legislatures have some time since had the management of their inland postage. All that the Government at home should undertake would be to carry the letters from Great Britain to any part or parts of the different colonies; charging 1d. for the land carriage, and 1d. for the sea transit; leaving to the legislatures to regulate all other charges. Their representatives will understand and make known their wants in their reports, and will be better able to carry them out than the local governments or the central post-office in St. Martin's-lane.

In the home-coming letters all that the post-office should do would be in like manner to receive all at once in some point as most convenient, and be responsible for their delivery in this country, and for their forwarding to ulterior destinations as the case might be.

The Society of Arts is much interested in the question. Its members are daily hindered in their correspondence on most interesting points owing to the charge, which amounts to a prohibition.

I am, Sir, yours obediently,

Datchett. A MEMBER.

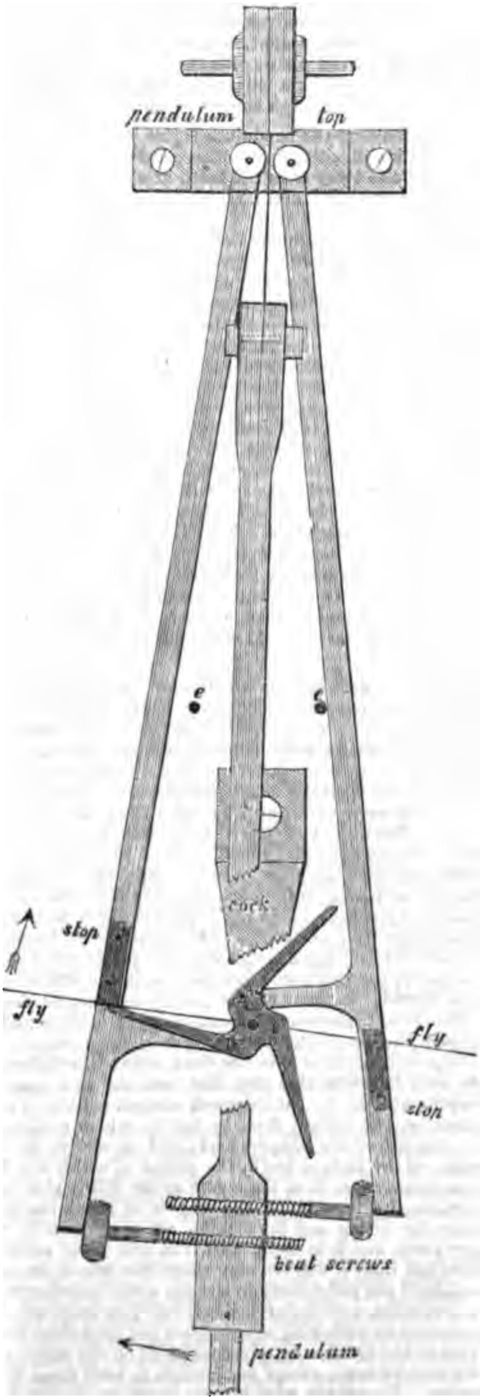
THE NEW GRAVITY ESCAPEMENT FOR CLOCKS.

SIR,—You may remember that, at Mr. Shepherd's lecture on electrical clocks about this time last year, I said, that the invention of a *remontoire*, or *gravity escapement*, *i.e.* one which will give a constant impulse to the pendulum, independent of all variations of force and friction, was no longer to be regarded as the great problem of clock-making, for that several clocks with such an escapement were then going, one of them being the great clock for the Houses of Parliament, of which the pendulum has now been keeping time for above a year; though at the rate at which Sir C. Barry has allowed the clock-tower to advance since the clock was ordered in February, 1852, nobody of the present generation of men is likely to get much benefit from it, except, I suppose, the maker, who will of course have to be paid for it at the time fixed by his contract.

Shortly afterwards I read a paper on that and some other recently invented escapements, which is printed in the "Cambridge Philosophical Transactions."* But as publications of that kind have not a large circulation, and as I have now some further information to communicate respecting this invention, I avail myself of this Journal for the purpose; and, in order to make such further information intelligible, I must give some description of the escapement, and the objects of such escapements generally.

Great as was the improvement effected in clocks by the invention of Granam's well-known dead escapement, it was only a mitigation, and not a removal of the disturbing causes of the commoner class of escapements, viz:—(1) the variations in the force of the train upon the escapement, owing to friction, the effect of cold on the oil, dirt, &c.; (2) the variations of friction on the pallets; and (3) the *circular error*, or the change of time due to the variation of the arc of the pendulum, which might arise from either or both of the above causes, independently of their own direct effects upon the rate of the clock. In an earlier paper in the Cambridge Philosophical Transactions, in 1848, I showed that the 'rate' of a dead escapement clock was expressed mathematically in three terms, corresponding to the above-mentioned three sources of error, and that the 1st and 3rd of those terms have a different sign from the 2nd; and moreover that they have no constant or definite relation to each other. And that is the reason why a clock of this kind is sometimes observed to gain while the arc of the pendulum decreases, and sometimes to lose, and vice versâ, according as the + or the — terms happen to preponderate. And for this reason, also, if there were no others, the once popular cycloidal cheeks, and other equivalent contrivances for rendering pendulums isochronous in different arcs, are not only useless, but may sometimes aggravate the errors of a clock instead of diminishing them, however well they may appear to answer in violent experiments for increasing the arc of a pendulum by some great addition to the clock-weight, without regard to other causes, which in the natural state of things may produce equal or greater effects in the opposite direction. Another consequence of the nature of the errors of a dead escapement is, that in order to secure good time-keeping, everything must be done that can be done to diminish friction throughout the clock, such as jewelled pallets, very fine pivots, and high numbered wheels, all of which add considerably to the expense; and moreover, it is impossible to attach to it any striking or electricity discharging work without the risk of disturbing the rate by the additional friction which all such appendages involve.

It was long ago perceived that all these evils might be avoided if an escapement could be made to give a constant impulse to the pendulum, and having no contact with it accompanied by any sensible amount of friction; and accordingly there have been multitudes of such escapements invented; but they have all failed in satisfying some one or more of the conditions which are essential to their success, and consequently none of them have ever come into use. What those conditions are will appear from the following description of an escapement which satisfies them all.



* Some extra copies of it were printed for Mr. Weale, the publisher of the "Rudimentary Treatise on Clocks," and may still be had from him.

This drawing is a back elevation of an astronomical clock with this escapement, three-quarters of the real size (not that the size is of much consequence). The train is the same as usual, except that it is inverted in position, so as to get the scapewheel at the bottom, and the wheel which turns in a minute now has 80 teeth, and drives a pinion of 8 on the arbor of the three-legged scapewheel. The scapewheel is behind the back plate of the clock frame, and on its arbor, between the plates, is a fly like a common striking fly, only larger; and the arbor of the minute wheel is made short, with its back pivot in a cock screwed to the front plate (with the screw-head in front) so as to leave room for a longer fly than could be got in if the arbor went through the clock frame.

In this drawing the pendulum is just leaving the right arm or pallet and taking up the other; and as soon as the stop is drawn quite away from the tooth now resting on it, the scapewheel will turn, and raise the other pallet by means of the pin which is now uppermost, until the tooth belonging to it is caught by the stop on that arm. If the arc at which the pendulum leaves one pallet and takes up the other is called c, and the extreme arc a, each pallet ascends with the pendulum from c to a, but descends with it not only to c, but to $-c$ on the other side of zero; and consequently the pendulum receives an impulse from the weight of each arm alternately through the arc $2c$. The scapewheel evidently turns once round in 6 beats of the pendulum; and that gives a large enough motion at each beat for the fly to restrain its velocity, and thus prevent it from moving so fast as to jerk the pallet too far out, in which case the tooth may not be caught by the stop, and then the wheel runs on still faster, misses several beats, and perhaps breaks a tooth when it is caught by the stop descending again. This is called *tripping*, and has been the principal mechanical difficulty of gravity escapements. In my late Cambridge paper I have mentioned the various contrivances which have been resorted to to obviate it, and it is not worth while to repeat them here, especially as none of them have even come into general use.

Even those escapements which have been tolerably safe against actual tripping under any probable variation in the force of the clock train, have sometimes been liable to another miscarriage quite sufficient to injure the character of gravity escapements generally, and the more so because (as far as I know) it has never been noticed. Though the force of the scape-wheel may not send the pallet so far as to let the tooth slip past the stop, it may send it farther than it ought to go and would go if it were lifted more slowly, and then the pressure of the tooth on the stop is generally sufficient to hold it there; and the consequence is that the pendulum does not begin raising as soon as it ought to do, viz., at the arc c before-mentioned; and as the pallet will always descend with the pendulum to the same place, the impulse is increased, and the rate of the clock altered. In some of the gravity-escapement clocks in the Great Exhibition, I found that you could sensibly increase the arc of the pendulum in a few minutes, by putting some extra force on the clock train; which showed that they failed in the very first essential of a gravity escapement. In the three-legged escapement this is prevented by two things; first, by the fly, which moderates the velocity of the scape-wheel; and secondly, by the length of the locking teeth, the points of which are five or six times as far from the centre as the lifting pins, and therefore the pressure on the stop is so much less than where the lifting and the locking are both done by the same teeth, and is so little, that if an arm is by accident raised too high it will not stay there, but falls again, and the face of the pallet rests on the pin which lifted it, until the pendulum arrives and carries it off. The small amount of friction at unlocking also renders the pendulum indifferent to the absence or presence of oil on the stops, and they require none, except just enough to keep them from rusting. Everybody who knows anything of clockwork will recognise this as a point of primary importance in any improvement in escapements.

All other gravity escapements that I am acquainted with involve at least as much delicacy of construction as the finest dead escapement. This, on the contrary, requires so little that it is hardly possible for a workman intending to follow the rules given for its construction, to make it so that it will not act perfectly. The makers of other gravity escapements too, even the best of them, never seem to have ventured to use a common train with low-numbered pinions and thick pivots; whereas, if a gravity escapement does what it professes, it ought to go just as well with a coarse train as a fine one. And this does so. The shortest proof of this is, that doubling the clock-weight produces no effect, either on the time or on the arc of the pendulum. I know how difficult it is to persuade clock-makers that any clock can go as well with a coarse train as a fine one; but every clock of this kind, which has been made under my direction, either for myself or other people, has been purposely made with a train no finer than that of a common house-clock, and the turret-clocks with all the wheels of cast-iron. Indeed, I saw one a few days ago, made by a clock-maker at Doncaster, with a scape-wheel pinion of only six leaves; not that I mean to recommend that, because such pinions cause a greater strain on all the wheels, and save very little in expense over pinions of eight. The first of these clocks of regulator size which was finished, was made with some old wheels, not even round, and brass pinions, and was sent to Greenwich by Mr. Dent (of the Strand), by desire of the Astronomer Royal, and submitted by him, as he told me himself, to some "malicious experiments," and it bore them so well that he concurred with me in authorising Mr. Dent to use it in the great Westminster clock; and it is well known to those who are acquainted with what he has written on escapements, that he was before under the impression that no escapement of this kind could answer.

In turret-clocks, besides the advantage of being able to use cast-iron wheels in the going part as well as the striking, there is no longer any occasion for long and heavy pendulums. That of the Westminster clock, which weighs 6 cwt. (I suppose, the heaviest in the world), had been made before this escapement was invented, or it would not have been so heavy. All the other large clocks which have been made with it have only a five-feet pendulum (1¼ seconds), with a bob of 150 lbs. which is a considerable saving in expense in a compensated pendulum, and generally more convenient for fixing. This escapement also (like a remontoire in the train, which is more expensive) allows you to put on weight enough to drive the hands through any weather, without affecting the pendulum, as the escapement will bear three times the weight that will make it go, if it is properly made, without any risk of tripping. And I now proceed to give the rules for making it, which I have found from observation of several clocks, since my Cambridge paper was written, to be on the whole the best, with reference to various considerations, mechanical and mathematical; for the latter of which I must refer the reader to the aforesaid paper.

The distance of the points of the scapewheel teeth from the centre should not be much less than 1-6th of the length of the arms (down to the stops); and the lifting pins should be 1-36th of that length from the centre. The arc, which I have before called c, will then be about 45′, or the pendulum will receive its impulse through 90′. The stops and the lifting faces of the pallets may be so adjusted as to make the depth of locking about 2-3rds of the distance of the pins from the centre of the scapewheel, or (in round numbers) 1-50th of the length of the arms. The arms should be only heavy enough to make the pendulum swing about 2° from zero. You need not be alarmed at seeing the pendulum have not much excursion beyond the point of unlocking; it is better that it should be so, because with this escapement the arc can never diminish so as to fail in unlocking, except from some accidental ob-

struction to the pallets, and it is better that such obstruction should indicate its presence at once by stopping the clock, as it will, if there is only a small margin left beyond the point of unlocking. In astronomical clocks the length of the arms has generally been made six inches; in turret clocks nine, or double the size of the above drawing; but there is no particular virtue in these sizes. The bend of the knee in the legs of the scapewheel is determined by the rule, that the pins and the points of the teeth alternately should lie on the radii of a regular hexagon. The stop on the pallet, which is struck upwards, must be set a little higher than the scapewheel centre, so that a straight line from there to the stop may form a right angle with the arm; for if the stop is lower than this, the blow will not be given in the direction of the arm, and will have a tendency to throw it outwards, which may as well be prevented, though it may not be enough to make the escapement trip. The other stop, however, should not be set so high as to form a right angle in the same way, because it will make the beats disagreeably unequal, and there is no occasion for it, as the action of the teeth on that stop, if set lower, is not to throw the arm out, but rather the contrary. The size of the fly in a regulator may be determined by trial. If you want a loud beat, you must have as small a fly as appears to be safe against any risk of tripping. In turret clocks I find the fly should be not less than five inches long, by an inch broad, in each vane.

The scapewheel is made of steel not more than 1-8th inch thick in a turret clock, and of course thinner in a regulator; the pins of brass wire, rivetted in. The scapewheel of the great Westminster clock does not weigh half an ounce. The points of the teeth should be made tolerably hard, but not quite sharp. The stops should be screwed on soft and adjusted to the proper depth of locking and then made quite hard and polished; and the lifting faces of the pallets the same. The pallets of turret clocks may be of iron only faced with steel: in astronomical clocks they can hardly be made light and stiff enough unless they are of steel, and not above 1-16th of an inch thich, and about as broad as those in the above drawing. The lower ends are bent backwards at a right angle. to embrace the beat-screws in the pendulum, the action of which is obvious. It is better not to put oil, as to the common fork, on the points of contact, as there is no sensible friction, and it may tend to stick the fork pins to the beat screws, and so resist the separation of the pendulum from the pallets; but the heads of the screws should be made of brass.

In a short time I hope to be able to lay before your readers the results of the application of this escapement to electrical clocks, for which it offers great facilities; and for that purpose the drawing which I have here given will be wanted again, as I have as yet said nothing about the two pins marked *e e*. But before I finish this letter, I take the opportunity of mentioning a mode of regulating pendulums, which (as far as I know) is new in practice, and particularly convenient, especially with this escapement, which allows you always to set the clock right within one beat of the pendulum without touching it, by merely lifting one of the pallets and letting the scapewheel run forward, or turning it back, which will alter the time by any even number of beats you please.

If the ten-thousandth part of the weight of a pendulum is stuck on to the rod half way down its length, it will make the clock gain a little more than a second a day: that being the place where any given weight produces the *maximum* effect, and where any shifting of that weight up or down produces the *minimum* effect. Consequently, a sliding weight there is a bad way of regulating a pendulum; and on the other hand, if a collar is fixed there, and the pendulum so adjusted that it goes nearly right with some small weight laid on the collar, it can always have its rate altered by any assignable quantity, by merely altering that weight. The best way of making a series of weights for the purpose is to try the effect of some weight large enough to accelerate the clock a good many seconds a day; then you will know what any aliquot part of it will do; and from that knowledge make a series of weights in geometrical progression, marked ¼, ½, 1, 2 (these will be quite enough), according to the number of seconds a day by which they will increase the rate when laid on the collar, and therefore diminish it when taken off; which can easily be done without disturbing the pendulum. One ounce will do a second a day in a pendulum of more than a quarter of a ton, and 10 grains in the common mercurial pendulum of an astronomical clock.

Yours faithfully,

E. B. DENISON.

42, Queen Anne-street, 10 Jan. 1854.

WILKINS'S NEW TELEGRAPH.

SIR,—In your Journal for December 30th, 1853, you have a description of "Wilkins's New Telegraph," which is so erroneous, that, however I might pass over it in the journal in which that description first appeared, I cannot do so now that the *Journal of the Society of Arts* has inserted it.

The following would be a more accurate, and, I hope, more interesting description for your readers:—A point or marker is held by a spring in contact with a ribbon of paper against a marking surface, and if the marker were moved by the hand, lines of any form might be traced. The marker is mounted upon an iron armature between four poles of two electro-magnets placed *vis-a-vis*. The armature is fixed on a centre between the poles, and attracted each end in an opposite direction. The armature being at rest, equidistant between the maghets, it follows that while the ribbon of paper is travelling between the marker and the marking surface, a line is drawn in the middle of the paper, and any diversion of the armature from the position of rest entails a corresponding diversion of the line drawn, and by the number and form of such diversions the message is composed. The automaton repeater connected with this telegraph is an apparatus devised to carry out the objects of Davey, (who to a certain extent succeeded to work a telegraph-recording instrument,) and to act as a relay of power to work other circuits. This instrument as now constructed, enables the longest circuits to be telegraphed over at once, without the operation of repeating. The telegraph is one wired, and one operator only is necessary, this advantage would recommend it were expense only considered, but the addition of greater certainty is secured likewise. The insulator is a means evident to the most ordinary capacity of accomplishing the insulation of over-ground wires. November, even at the present day, is the purgatory of telegraphs.

Yours, &c.,

J. J. WILKINS.

FLAX, AND ITS PRODUCTS, IN IRELAND(a).

CONTRIBUTED BY WM. CHARLEY, SEYMOUR-HILL, BELFAST.

LETTER VI.

Contrary to the intention expressed in my last letter, I have decided, after some consideration, to complete the *history* of the flax plant in Ireland to the present decade, before giving any detailed account of recent improvements. In doing so, however, it is impossible to divide my subject

(a) It has been mentioned by Professor Hodges, in a paper on flax, read before the British Association when in Belfast, that the old Irish or Celtic name for flax is *Lhin*. This closely resembles the French *Lin*, the Latin *linum*, and the English *lint and linen*. It has been also stated that linen dyed yellow was much worn by the ancient Irish; and in the Brehon Laws the Brughaidho, or farmers, were obliged to learn and practice flax cultivation. (See Edward Campion's Annals.)

into any regular and progressive series, except, perhaps, that of *time*. I purpose therefore to continue to give, from the best authorities and in a condensed form, a statement of the events that have had an effect on the production or manufacture of the plant, or have been in some way connected with its prosperity.

The year A.D. 1816 was that in which Mr. Lee figured so prominently. The only interesting facts I find in the following year are—1st, a report to the Linen Board by one of their inspectors, of a tour through Scotland and Yorkshire, for the purpose of obtaining and imparting information; 2ndly, a published account from the House of Commons, giving a statement of all the importations of flax into Great Britain from 1807 to 1816; 3rdly, the printed instructions issued by the government, directing how the canvas for his Majesty's navy should be prepared. With regard to Mr. Marshal's report to the Linen Board, I may state that he gives an account of the cultivation of the plant in North Britain, and recommends the great care taken by the producers and manufacturers there, especially in the *scutching* process.

The following is the result of a trial made by him on Irish and Scotch flax, the former dried by fire heat, the latter by air:—

112 LBS. IRISH HACKLED.	lbs.	112 LBS. SCOTCH HACKLED.	lbs.
Flax	56	Flax	80
First Tow	32	First Tow	12
Second Tow	20	Second Tow	17
Waste	4	Waste	3
	112		112

"These parcels were hackled to the same quality for mill-spinning, and left a balance in favour of the Scotch of about twenty-five per cent. The reason of this difference, I, as well as those present, attributed to the fire-drying of the Irish flax, by which it loses the oil, becomes hard, and the fibre easily broke. In Scotland the flax is air-dried in the field." (See Linen Board Report.) Mr. Marshal recommended the scutching-mill, for which a premium of £50 was accorded by the Linen Board of Scotland(a)

In addition to the scutching-mills the inspector advised the adoption, in Ireland, of a *two-handed* wheel for spinning; some of these he brought over; but about this time steam power and machinery were being tried for yarn spinning, and this tended to distract attention from the old-fashioned system of *hand* labour. It appears that so far back as 1793, *mill* spinning was begun in Scotland, but that the fluctuating prices for the raw material, from Russia and Holland, almost ruined the enterprising proprietors. This fluctuation was caused by the wars of the period, and in one year ranged from £30 to £150 per ton for the same quality of flax!

A desire was felt in Ireland to supply the Scotch manufacturers who were in the habit of buying the Baltic flax, and Mr. Marshal having inquired the cause of their not taking Irish, was told the system of kiln-drying, so much carried on in Ireland, and the fibre was so imperfectly scutched that they found, in these respects, it was inferior to the continental, though, in some other points, it was perhaps superior; it was added that the shipments from Belfast were much the best in quality, and were rapidly improving.

The return of the imports of *undressed* flax into Great Britain already referred to is as follows:—

A.D.	cwts.	A.D.	cwts.	A.D.	cwts.
1807	416,598	1810	511,383	1814	498,848
1808	216,949	1811	234,390	1815	325,891
1809	523,149	1812	362,894	1816	212,619

Out of these quantities almost three-fourths came from Russia, and the chief part of the remainder from Holland and Prussia. As I will, on a future occasion, give some statistics of the present imports of flax, I shall leave this subject for the present, and at once pass on to the "Instructions for making his Britannic Majesty's Navy Canvas," which are dated from the Navy-office, January 1814:—"1st. The chain or warp of the canvas to be spun from the *longs* of the best Riga flax, or the best St. Petersburgh 12-head flax (if free from blacks), or the best English or Irish *watered* flax. The flax to be well dressed, and free from any mixture of *short* flax, and the yarn to be well and evenly spun, and *better twisted* than has been usual heretofore. 2nd. The weft or shoot to be spun from the longs of the best Riga or St. Petersburgh 12-head flax (if free from blacks), and well dressed on the same hackles that are used for dressing the flax from which the chain or *warp* yarns are spun. N.B.—Although different kinds of flax are named, yet the Navy board reserve to themselves the right of restricting to either, as the quality of flax, or other circumstances may render necessary from time to time. 3rd. The boils are ordered to be made from American *pot* and St. Petersburgh *pearl* ashes." These are minutely described, and no operations of this kind to be allowed during the winter months. The rules extended to *twelve*, and were distributed among all the manufacturers for the fleet.

During the years 1818 and 1819, I do not find much of importance; the Linen board and trade appear to have gone quietly on with their routine duties. The improved scutching machinery, recommended by Mr. Marshal, was, to some extent, introduced into Ireland; a great many scutch mills, of the most approved class, were erected in different parts of the country, and among other parties that took an interest in this good work was the Drapers' Company of London, on their estates in the north of the island. Some seizures, I find, were made at various times of unsound flax seed, and an allusion is made to the demand for old Riga and Dutch flax barrels for the purpose of being refilled and sold in a deceptive manner. Early in 1820 Mr. John Wilson, of Dundee, attracted some notice to his invention of a new machine for dressing flax, which he styled, (perhaps rather prematurely) "The Farmer's Friend;" the price was only five guineas; but "it did not take," and soon sunk into oblivion. At this time a new measuring machine was also talked about, the proposal of a Mr. Coulter, and towards the end of the year a real genuine improvement was invented and carried out, namely, the new patent "temples" for weaving. In the old system rows of teeth were used to retain the web at its width in the loom; these frequently so marked the selvage as to give it a torn and imperfect appearance, which was very objectionable. To obviate this, a mechanic at Dromore planned a set of "temples" to hold the cloth like pincers, and not to puncture it in any way. At a meeting of the Linen Trade, in Belfast, a committee(a) was appointed to examine and report on the subject. The result was an order to the mechanic for 400 pairs for gratuitous distribution, and a strong recommendation to the Linen Board for a reward. After some delay he received £100. These temples are now in general use, and have contributed very much to improve the quality of Irish linen cloth. It is mortifying to think of the trouble there was in procuring any reward for this great improvement, and how much more easily the money was obtained for Mr. Lee. Perhaps it was thought "no good thing could come out of" poor Ireland, and that all useful improvements must of necessity be imported from other countries! On the 23rd of August, 1821, His Majesty George IV. visited the Linen Hall and Board Room in Dublin, and received a complimentary address. The Trustees made some reductions in their expenses this year, but the Parliamentary grant continued the same as

(a) This Linen Board appears to have had both influence and friends at this time. A sum of £3000 per annum was entrusted to their care for the promotion and improvement of the manufactures in North Britain.

(a) These names were B. Williamson, J. Charley. R. Curteis, J. Sinclaire, J. M'Cance, A. Stewart, and J. S. Ferguson.

usual. The following explains the particulars of the grant:—(See Linen Board report.)

"The sum of two thousand pounds for one year to encourage the raising of sufficient quantities of hemp and flax in this country	£2,000
The further sum of two thousand pounds for one year, for the encouragement of the hempen and flaxen manufactures in the provinces of Leinster, Munster, and Connaught	2,000
The further sum of seven thousand two hundred and fifty pounds for one year, &c., to encourage the growth of flax in this kingdom	7,250
And the further sum of ten thousand three hundred and fifty pounds for one year, &c., to be by the said Trustees applied in such manner as shall appear to them to be most conducive to promote and encourage the said manufacture, the said sum to be in the place and stead of a like sum paid to them out of the produce of the duties on teas and coffee	10,350
Total	£21,600"

About this time two evil practices pursued by the weavers attracted much notice among the merchants, namely, that of plaistering the brown linen, so as to give them an artificial appearance of weight and strength; and the other, the habit of rubbing or calendering the linen to such an extent as to injure its durability, especially at the selvage; this rubbing gave the piece a finer and richer appearance than it otherwise would have had, and thus deceived the eye of the buyer. These two systems of trickery were thoroughly exposed by the merchants at various meetings, and stringent measures were adopted to remedy the nuisance and keep up the reputation of the manufacture. As the existing laws did not prove quite sufficient for this emergency, a new Bill was desired, and on the 2nd of April, 1822, I find that Mr. John Charley, of Belfast, as a representative of the linen merchants, was called before the Linen Board in Dublin to confer with them on the subject of a new Bill to be introduced for the better regulation of the trade.

In addition to the frauds attempted by the petty manufacturing weavers on the merchants I find that the farmers ran considerable risk of deception from the dealers in flax seed. On the 10th of April in this year a respectable Newry merchant writes to his friends at Belfast, "But little genuine Dutch flaxseed now remains unsold, but they are *making Dutch* here as fast as they can get empty hogsheads!" It is some consolation to think that the class of linen manufacturers and flaxseed dealers are now so respectable that very few instances of such foul play occur now. No doubt if the agriculturist is too parsimonious to pay a proper price for flaxseed he may find some cunning rogue able and willing to accommodate him with a low priced article. The self-satisfied farmer may be proud of his apparently cheap bargain at seed time, but when the crop arrives near maturity he finds to his horror that one half of the produce is some useless weed and that the little flax among it is scarcely worth saving. In his despair he blames everything but his own folly; he does not admit that he "was penny-wise and pound-foolish," but protests with obstinate determination to his neighbour that he will never grow flax again, and returns to his old-fashioned rotation of crops. This is the way that many experiments made by uneducated farmers in cultivating flax are conducted and terminated; as this class becomes better informed and more generally possessed of sufficient capital such errors will of course more rarely occur. On the 28th of May, 1822, the following letter was addressed to the secretary of the Linen Board from Dublin Castle:

"I have to acknowledge the receipt of your letter of the 17th and 23rd instant, which together with their inclosures I have submitted to the Lord Lieutenant, and am directed by his excellency to acquaint you, that he is willing to grant three thousand pounds to the trustees of the Linen Manufacture, to be expended in the purchase and distribution of flaxseed; but his Excellency relies on the Trustees taking care that this sum is properly applied for the purpose required, and that their officers do not purchase any flaxseed except where they are satisfied that the ground has been prepared to receive it, and that they do not give the seed to any persons except such as are unable from poverty to purchase it."

This distribution of seed appears to have done much good, as the Earl of Clare wrote to the government for a renewal of the grant the following year. This was brought under the notice of the Linen Board, in a letter from the Right Hon. Henry Goulburn, then Irish Chief Secretary.

Dublin Castle, Nov. 30, 1822.

"I send you herewith, by command of the Lord Lieutenant, a letter which has been received from the Earl of Clare, requesting to be informed if it is the intention of Government to furnish a supply of flaxseed during the ensuing year, and pointing out the advantages which are likely to result from such a measure, if adopted. And I am desired by his Excellency to acquaint you that, in appropriating the balance of the original grant for this purpose, during the ensuing season, to the objects to which it was at first destined, the county of Limerick appears to his Excellency to have a fair claim to be considered in any further distribution of seed which you may judge proper to make, of which Lord Clare has been acquainted."

In addition to the labours of the Linen Board in Dublin, local efforts towards improvement were not wanting in the Provinces. The North Western and North Eastern Agricultural Societies offered premiums, and assisted in many ways to improve the cultivation of all crops, including flax.

We are now approaching the period when Parliament withdrew the annual grant from the Linen Board; from this (1823), to the conclusion of their operations—embracing upwards of five years—will be described in a future paper.

DECIMAL COINAGE.

Sir,—I observe in the papers, and hear also a good dea of discussion on the subject of the Decimal Coinage, but there seems generally a want of a complete and accurate knowledge of the requisite data for deciding the question —What system of decimal coinage shall we adopt? It has occurred to me that a tabular view of the features of the leading plans might be useful, and I send you herewith such a sketch for insertion in your Journal, which, with the following explanations, will, I trust, be intelligible.

It is assumed that, under any system, we shall require about ten coins, in value near our present pound, half pound, crown, florin, shilling, sixpence, threepence, penny, halfpenny, farthing; that, as at present, not more than four of these shall be used as money of account; and that each of the others shall bear the simple relation of two or half to one of these coins of account. The fourth column, under the head "Value," is for farthings or parts of one farthing; the term "Basis," is applied to the leading coin of our present money, which is made a coin of account in any of the new systems; the term "Convertible," applied to a new coin, signifies that it can be exchanged exactly into our present coinage; those with fractions of a farthing in their values are not convertible. By the "Continental System," is meant that in which the *franc* (ten pence) is the basis or a leading coin, as in France, Belgium, Holland, and the kingdom of Sardinia, while other states have coins nearly of the same value. If Britain were to adopt the franc or half franc (as in 3 and 4 of the Table), it would be easy to have one uniform system throughout Europe. The dollar and the franc—in reality the penny—enable us to assimi-

late with almost all the world. I do not wish to enter on any discussion at present, but should like to draw attention to Nos. 3 and 4 of the table, the new coins in which (with one exception) are convertible, and which readily assimilate with the systems of other countries.

TABULAR VIEW OF FOUR PLANS FOR A BRITISH DECIMAL COINAGE.

New Money of Account.	Mils.	Value.	New Coinage. Old Coins	New Coinage. New Coins	Value.	Replacing the
		£ s. d. f.	*Old Coins*, 4.	*New Coins*, 6.	s. d. f.	
1.—Pound	1000	1 0 0 0	Pound	4 Shilling piece	4 0 0	Crown
Florin	100	2 0 0	½ Pound	2 Cents.	4 3 1-5ths	Sixpence
Cent	10	2 1 3-5ths	Florin	Cent.	2 1 3-5ths	Threepence
Mil	1	24-25ths	Shilling	½ Cent.	1 4-5ths	Penny
				2 Mils.	1 23-25	Half-penny
				1 Mil.	0 24.25	Farthing
	New Half-farthings.	s. d. f.	*Old Coins*, 5.	*New Coins*, 6.	s. d. f.	
2.—½ Pound	1000	10 0 0	Pound	4 Shilling piece	4 0 0	Crown
Shilling	100	1 0 0	½ Pound	2d. piece	2 1 3-5ths	Threepence
New Penny	10	1 0 4-5ths	Florin	New Penny	1 0 4-5ths	Penny
New ½ Farthing	1	12-25ths	Shilling	New Half-penny	2 2-5ths	Half-penny
			Sixpence	New Farthing	0 24-25	Farthing
				New ½ Farthing	0 12-25	Half-farthing
	Tenths of a Penny.	s. d. f.	*Old Coins*, 2.	*New Coins*, 8.		
3—Eight Shillings & Fourpence	1000	8 4 0	Penny	16s. 8d. piece	Seven Convertible.	Pound
Tenpence (*franc*)	100	10 0	Half-penny	8s. 4d. "		½ Pound
Penny	10	1 0		4s. 2d. "		Crown
Tenth of a Penny	1	0 2-5ths		1s. 8d. "		Florin
				10d. "		Shilling
				5d. "		Sixpence
				2½d. "		Threepence
				1-10th *d.*	0 0 0 2-5ths	Half-farthing
	Half-pennies.	s. d. f.	*Old Coins*, 3.	*New Coins*, 7.		
4.—Dollar or Crown	100	4 2 0	Penny	16s. 8d. piece	All Convertible.	Pound
Fivepence (*half-franc*)	10	5 0	Half-penny	8s. 4d. "		½ Pound
Half-penny	1	2	Farthing	4s. 2d. "		Crown
				2s. 1d. *or* 1s. 8d.		Florin
				10d. "		Shilling
				5d. "		Sixpence
				2½d. "		Threepence

LEADING FEATURES.

1. Basis, the pound; four degrees; least coin, nearly one farthing; four coins retained; sixpence, penny, halfpenny, and farthing given up; six new coins, of which five are not convertible.

2. Basis, the shilling; four degrees; least coin, nearly one half-farthing; five coins retained; sixpence, penny, halfpenny, and farthing given up; six new coins, of which five are not convertible.

3. Basis, the penny; four degrees; least coin, nearly one half-farthing; two coins retained; pound, half-pound, crown, florin, shilling, and sixpence, given up; eight new coins, of which seven are convertible; by the franc, assimilates with the continental system, and by the 4s. 2d. (dollar) with the American system.

4. Basis, the halfpenny; three degrees; least coin of account, one halfpenny (but the farthing retained); three coins retained; pound, half-pound, crown, florin, shilling, and sixpence, given up; seven new coins, all convertible; by the half-franc, easily assimilates with the continental system, and by the dollar with the American system.

P. Q. R.

Proceedings of Institutions.

GUILDFORD.—The Lecture Season at the Institute was opened by Dr. Lankester, who, in his usual popular and instructive style delivered a lecture on "The Air we Breathe." The lecturer, after giving a sketch of the component parts of the air, proceeded to point out the benefits derived by the animal and vegetable kingdoms from the gases—oxygen and nitrogen—of which it consists. He described the processes of putrefaction, combustion, and respiration, and pointed out the fact that the atmosphere acted as a medium of interchange between the mineral, vegetable, and animal kingdoms. He concluded his lecture by strongly urging his hearers to use every effort to procure for themselves and their neighbours a removal of all nuisances calculated either to deteriorate the quality, or to limit the quantity of "the air we breathe." Mr. Edmund Wheeler has delivered two highly-interesting and instructive lectures on the Electric Telegraph; the collection of models (working and otherwise) and of carefully drawn diagrams possessed by the lecturer, aided by his lucid explanations, kept a large audience quietly attentive for nearly two hours each evening. Robert Austin, Esq., Vice-President of the Institute, gave a gratuitous lecture (the 6th of a

series) on Local History,—"Guildford and its Neighbourhood at the Time of the Doomsday Book." Mr. Cowden Clarke, has given two lectures on the subordinate characters in—1st "Cymbeline," and "The Two Gentlemen of Verona; 2nd, "King John" and "The Winter's Tale;' this gentleman invariably attracts large audiences; his truly philosophic analysis of the variety of character, and his nice appreciation of the lights and shadows so dexterously introduced by "Glorious old Willie," combined with a good-humoured bluntness in the expression of his opinions, render him a great favourite. A Lecture on the "Wonders of Mechanical Philosophy," by Prof. Partington, was received with marked attention and interest, as was also one (gratuitous,) by Mr. H. Medlock, of London, on the "Chemistry of Organic Life;" this lecture concluded the first division of the season.

Horncastle.—The Annual General Meeting of the Mechanic's Institution, was held on Friday, the 6th inst. Mr. Thos. Meredith, V.P. in the chair. The meeting was one of the largest ever held in the Society's room. After auditing the Treasurer's accounts, the report of the committee was read, from which it appeared that the recent alterations in the rules, by which newspapers were admitted into the reading-room had been productive of great advantage to the Institution. Several new members had been elected during the year, not only filling up the vacancies caused by deaths, removals, and resignations, but increasing the total number of members. The reading-room was regularly attended by a large number of members, and the sub-librarian's register showed the total number of books and periodicals taken out of the room for perusal during the year to have been upwards of 4,000, being an increase of 1,400 above the entry for 1852. Altogether the Institution appears to be in a more prosperous state than it has exhibited for some years. Sir Henry Dymoke, Bart., the Honourable the Queen's Champion, was unanimously elected a Vice Patron of the Institution. The following annual officers were also elected for the current year:—President, Richard Clitherow, Esq.; Vice Presidents, Dr. Boulton and Messrs. S. Sketchley, J. Carter, and W. Smith; Treasurer, Mr. W. A. Rayson; Secretary, Mr. Charles Dee; Librarian, Mr. D. Worthington.

Miscellanea.

A Method of extracting the Iodine from its connection with metals, up to the last remnant, and in a perfectly pure state, by one operation, has, it is said, been discovered by Dr. H. Schwarz, Professor of Techmical Chemistry at Breslau.—It is reported that the method is no less simple then inexpensive.

Iodised Manures as a Remedy for the Vine Disease.—It is doubtless well known to most of our readers that the vineyards of Southern Europe and the Madeiras have been blighted by a microscopic acarus, the *Oidium Tuckeri*, and that the price of wines, raisins, &c., has been considerably raised. It has, however, been ascertained that the use of manures rich in iodine, enable the vine to resist these destroyers. In certain districts of Spain decomposed seaweeds are ordinarily used as manure. In those parts in which the amount of iodine in the soil may average 1-600,000, the vines have entirely escaped.—*The Artisan Journal.*

Arab Calculation.—The utmost exactitude is required at Alexandria in checking the number of boxes which forms the India, China, and Australian mail passing through Egypt. The illiterate Arabs who take charge of the mails in that country have a unique and unerring method of keeping an account of the number of boxes, and which is done by a string of beads; as each box is passed before the eye of the Arab a bead is thrown over his shoulder, where one end of the string rests. The power of mental abstraction possessed by the Arab, together with the simplicity of his numerical operation, enables him, amidst confusion and noise, to keep an exact account of any number of boxes of which he is to take charge, without any chance of a mistake.

Nature Printing.—As the priority of this invention is a matter of some interest at the present time, it may be useful to mention that Dr. Branson has *written* evidence of his attempts at nature printing so far back as 1848; when he received from Mr. Maund, publisher and author of the "Botanist," a letter acknowledging the receipt of certain specimens: Mr. Maund says: "—The gutta percha impressions are interesting, and also shadow "forth ideas of progress in the art of copying. If an impression of "a fern be taken in gutta percha, with the ultimate intention of "depositing metal in it, to produce a plate for surface printing, "may not the gutta percha mould have thin coats of size and "whiting repeatedly applied, so as to leave the impression "deeper, and consequently to produce an electro-plate with the "line more prominent, hereby enabling the letter-press printer "to obtain an impression from the lines alone, repre- "senting the prominent views, without interference of "the intermediate spaces, which should be without colour.' On the 6th of December, 1850, Dr. Branson read a paper on the subject to the Sheffield Literary and Philosophical Society; and on the next day the following notice appeared in the *Sheffield Times*:—"Dr. Branson has described to the Sheffield Literary "and Philosophical Society this process. His mode of operation "is to place a frond of fern, algæ, or similar flat vegetable form, "on a thick piece of glass or polished marble; then taking and "softening a piece of gutta percha of proper size, and placing it "on the leaf and pressing it carefully down, it will receive a "sharp and accurate impression from the plant. The gutta "percha, retained level, and allowed to harden by cooling, is "then handed to a brass-caster, who reproduces it in metal from "his moulding base. This, it will be obvious, is the most deli- "cate and difficult part of the process. Dr. Branson has many "brass plates thus produced from sand-casting, which only "require a little surface-dressing to yield at once, under the "copperplate printing press, most beautiful as well as faithful "impressions of the original leaves; indeed many of the exhi- "bited specimens of ferns, printed in green colour, and slightly "embossed, as they must be, by the printing, were such perfect "fac-similies of the natural pattern, that they might easily be "taken for it. Besides these matters, the Doctor exhibited a "large variety of patterns of embossed leather, which had been "produced by a somewhat analogous operation. As, however, "this invention is not so much for copying designs as for cre- "ating them, and at the same time saving all the expense of "die-cutting, the following is the course pursued:—The operator "takes a piece of common hard white soap of the required size "and surface, and upon that executes any design, whether "of the depth and boldness of ordinary embossing, or "in the delicate lines of an etching; in either case the "work is executed with the greatest ease. From this soap "model or engraving an impression is taken in gutta "percha; from that a secondary one, which, on being cast in "brass, as before, may be used for printing or embossing in the "ordinary way. The Doctor stated that his main difficulty was "in getting the last gutta percha coat to separate from the "mould of the same substance into which it was pressed. He "had found, however, that by powdering both surfaces with "common bronze dust, before taking the impression, they did "not adhere."

MEETINGS FOR THE ENSUING WEEK.

Mon. London Inst., 7.—Mr. J. Phillips, "On the Philosophy of Geology."
Statistical, 8.
Chemical, 8.

Tues. Horticultural, 3.
Royal Institution, 3.—Prof. Tyndall "On Heat."
Civil Engineers, 8.—Renewed discussion on Mr. Harrison's paper, "On the Drainage of the District South of the Thames."
Linnæan, 8.
Pathological, 8.

Wed. Society of Arts, 8.—Mr. C. T. Judkins "On Stitching Machines."
Geological, 8.—Mr. J. Prestwich, jun., "On the Structure and Origin of 'Sand Pipes' in the Chalk."
London Institution, 7.—Conversazione.

Thurs. Royal Institution, 3.—Prof. Wharton Jones "On Animal Physiology."
Antiquaries, 8.
Royal, 8½.

FRI. Architectural Assoc., 8.
Professor Faraday "On Electric Induction. Associated cases of Current and Static Effects."
Royal Inst., 8½
SAT. Asiatic, 2.
London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany."
Royal Botanic, 3¾.
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, 6*th January*, 1854.]

Dated 13*th August*, 1853.

1900. J. Gwynne, Essex street, Strand—Black powder from coal, for paints, blackings, &c.

Dated 29*th November*, 1853.

2776. E. J. Hughes, Manchester—Purifying, &c., the colouring matter of madder, munjeet, &c.

Dated 22*nd December*, 1853.

2974. L. A. F. Besnard, Paris—Printing by means of lithography.
2976. W. H. Woodhouse, Parliament street—Roads, ways, and ducts.
2978. B. Murgatroyd, Bradford—Washing, &c., wool, alpaca, mohair, &c.
2980. J. Gibbons, jun., Wolverhampton—Locks and latches.

Dated 23*rd December*, 1853.

2982. J. Gillow, jun., Northwich—Salt.
2984. J. O'Neil, Bury—Drawing condensed steam and air from pipes, &c.
2986. J. D. Pfeiffer, Paris, and 4, South street, Finsbury—Machine for cutting paper, &c.

Dated 24*th December*, 1853.

2988. J. Gaultier, Paris, and 4, South street, Finsbury—Washing and bleaching.
2990. J. Margerison, Preston—Railway breaks.
2992. G. A. Buchholz, Gould square, Crutched friars—Cleaning, &c., grain.
2994. T. Cooper, Leeds—Binding of ledgers and books.

Dated 27*th December*, 1853.

2998. G. J. Mackelcan, Lechlade, Gloucester-Winnowing machines.
3000. T. S. Prideaux, St. John's Wood—Apparatus for regulating supply of air to furnaces, and for preventing radiation, &c.

Dated 28*th December*, 1853.

3002. J. Parkinson, Bury—Governors.
3004. J. Taylor, Birkenhead—Raising and lowering weights.
3006. J. Alexis, Avignon—Railway break.
3008. J. Mackintosh, 12, Pall Mall East—Discharging projectiles.
3010. F. Parker, Northampton—Gaiters.
3012. D. M'Nee, Hill-field, Kirkintilloch, and A. Broadfoot, 128, Ingram street, Glasgow—Printing with colours on cloth, &c.

Dated 29*th December*, 1853.

3014. H. Jackson, High street, Poplar—Moulding bricks, &c.
3016. M. Phillips, Birmingham—Metallic revolving shutters. (A communication.)
3018. J. White, East street, Red Lion square—Friction joints.
3020. C. A. Roux, Belleville, Paris, and 16, Castle street, Holborn—Printing warps of cut pile, &c.
3022. A. V. Newton, 66, Chancery lane—Screws. (A communication.)

WEEKLY LIST OF PATENTS SEALED.

Sealed 4*th January*, 1854.

1599. Marcus Davis, of 52, Gray's inn lane—Improvements in carriages, scaffoldings, and ladders, which scaffoldings and ladders are used as carriages.

Sealed 6*th January*, 1854.

1607. Thomas Newey, of Garbett street, Birmingham—Improvements in fastenings for wearing apparel.
1616. John Woodward, of Platt street—An apparatus for curling hair.
1628. William Robertson, of Rochdale—Improvements in machinery for preparing, spinning, and doubling cotton wool, and other fibrous substances.
1633. Philippe Poirier de St. Charles, of Fulham—Improvements in apparatus for measuring and indicating the distance travelled by cabs and other vehicles.
1636. Ewald Riepe, of Finsbury square—Improvements in the manufacture of turret or clock tower and such like bells.
1696. Jean Baptiste Jelie, of Alost, Belgium—Improved machinery for dressing or polishing thread.
1711. Donald Brims, of No. 159, Southwark Bridge road—Improved safety apparatus for the protection and preservation of life on water.
1806. Peter Armand Le Comte de Fontainemoreau, 4, South street, Finsbury, and 39, Rue de l'Echiquier, Paris—Improved mode of regulating the electric light.
2042. John Clare, junior, of Liverpool—Improvements in the construction of iron houses, vessels, masts, spars, smoke-funnels, boilers, cylinders, beams, and other like structures or articles.
2236. James Willis, of Wallingford—Improvements in gig harness.
2388. George Frederick Chantrell, of Liverpool—Improved apparatus applicable to the manufacturing and the revivification of animal or vegetable charcoal, and other useful purposes.
2458. John Fordred, of Dover, and Thomas Boyle, of Forest Gate, Essex—Improvements in daylight reflectors, and in apparatus to be used in connection therewith.
2480. Thomas Dunn, of Windsor Bridge Iron Works, Pendleton, near Manchester, and William Gough, of 21, Old Compton street—Improvements in the manufacture of veneers, and in machinery and apparatus connected therewith.
2632. William Hadfield, of Manchester—Certain improvements in looms for weaving.
2636. Matthew Gray, of Glasgow—Improvements in weft forks for power looms.

Sealed 9*th January* 1854.

1637. Ewald Riepe, of Finsbury square—Improvements in moulds for steel castings.
1641. Pierre Auguste Tourniere, of Lawrie terrace, St. George's road, and Louis Nicholas de Meckenheim, of Birmingham—Improvements in the manufacture of soap and washing paste, and of the materials used therein.
1653. William Levesley, of Sheffield—Improved method of making table knife blades.
1736. William Huntley, of Ruswarp, near Whitby—Improvements in engines worked by steam, air, or fluids.
1757. Thomas Banks, of Derby, and Henry Banks, of Wednesbury—Improvements in apparatus for retarding and stopping railway trains, which improvements are also applicable to vehicles travelling on common roads.
1785. Peter Armand Le Comte de Fontainemoreau, 4, South street, Finsbury, London, and 39, Rue de l'Echiquier, Paris—Improved mode of producing an electric current.
1919. William Hunt, of Lee Brook Chemical Works, near Wednesbury—Certain improvements in manufacturing sulphuric acid.
1961. William Rettie, of Aberdeen—Improved construction of submarine lamp.
2065. Robert Harrington, of Witham—Improvements in umbrellas and parasols.
2601. James Atkins, of Birmingham—Improvement or improvements in ash pits for grates.
2609. Alexandre André Victor Sarrazin de Montferrier, of Paris, and of 4, South street, Finsbury—New rotatory steam engine.
2613. Richard Dryburgh, of Leith—Improvements in the means of holding staves while being cut.
2621. Johan Martin Levien, of Davies street, Grosvenor square—Improved construction of expanding table.

Sealed 11*th January*, 1854.

1645. George Agar, of Witham, Essex—An apparatus for holding and turning over the leaves of music or music books.
1650. George Dalton, of Lymington—Improvements in reverberatory and other furnaces.
1651. Felix Lieven Bauwens, of Pimlico—Improvements in the manufacture of candles.
1652. Joseph Bacon Finnemore, of East Row, Birmingham—Improvements in sofa springs, useful for spring-stuffed upholstery work generally, and in the adaptation thereof to mattresses.
1658. James Fletcher, of Facit, near Rochdale—Certain improvements in machinery used for spining, doubling, and winding cotton, wool, flax, silk, and other fibrous materials.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854.				
Jan. 5	3547	An adjusting arm for reclining chairs	Henry Hill & Richard Millard	7, Duncannon street, London.
" "	3548	The Windsor cravat	Dent, Allcroft, & Co.	Wood street, Cheapside.
" 7	3549	Captain Field's improved parallel rule	J. D. Potter	31, Poultry.
" "	3550	Button	Hammond Turner & Sons	Birmingham.
" "	3551	Metal button	Hammond Turner & Sons	Birmingham.
" 10	3552	Water-closet	Stock & Son	Birmingham.

Journal of the Society of Arts.

FRIDAY, JANUARY 20, 1854.

SEVENTH ORDINARY MEETING.

Wednesday, January 18, 1854.

The Seventh Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 18th instant, Thomas Winkworth, Esq., in the Chair.

The following candidates were balloted for, and duly elected:—

Abbott, Robert
Brooks, Vincent
Eady, Charles James
Gadsden, Augustus Wm.
Hume, William Wentworth Fitzwilliam, M.P.
Malcolmson, James
Nicholon, G. T.
Pulman, James Heard
Rushbrook, Capt. the Hon. George, M.P.
Scott, Abraham Charles
Whitwell, John

The following Institutions have been taken into Union since the last announcement:—

328. Ashton and Dukinfield, Mechanics' Institution.
329. Croydon, Literary and Scientific Institution.
330. East Dereham, Institute.
331. Masham, Mechanics' Institution and Literary Society.

Previous to the reading of the Paper, the Secretary stated that he had received a communication from M. Demolon, of Paris, relative to Fish Guano, accompanied with a sample, in which he said that he had been, for some time past, manufacturing it to a considerable extent. With reference to the supply of fish for the purpose, M. Demolon had found there was no difficulty in procuring any amount at about 20 francs, or 16 shillings, per ton. The Secretary also called attention to some samples of a substance received from Madras, which appeared similar, in some respects, to Gutta Percha. Dr. Ferguson Branson's Specimens illustrative of the application of Soap as a Means of Art, were exhibited to the meeting, including drawings on soap, plaster and metal casts taken from Gutta Percha impressions of the soap drawing, embossed leather and paper, etchings, &c., &c.

The Paper read was

ON STITCHING MACHINES.

By C. T. Judkin.

In submitting to the Society of Arts a specimen of a Machine which enjoys an almost unparalleled degree of patronage in Great Britain and America, among those manufacturers for the execution of whose work it is especially intended, I derive a high degree of satisfaction from the reflection, that few inventions have wrought so little injury to the interest of the labourers in the department into which it enters as a competitor. To say that a machine does not supersede a certain amount of human handicraft by an enhanced celerity and increase of production, would be tantamount to registering the uselessness of the invention, and offering a puzzling anomaly for solution All machines must, more or less, interfere with the artizan on their first appearance in the labour market, for the simple reason, that they rival his occupation, and cast him upon other resources, before they have sufficiently multiplied production to make him a participator of the cheapness of which they are the authors.

But such inventions as at once provide to a great extent new channels of employment, and transfer the labourer from a task destructive of his constitution, to one which is promotive of health, must come into the category of public blessings, instead of being resisted as a foe and a mischievous intruder; the evil, if any, in the present instance, is immensely counterbalanced by the vast benefit in the future. And this is the position claimed for the Sewing Machine.

Were the invention now before you entirely British, it would find its prompt excuse and justification in the deleterious vocation of the needlewoman. For years past, public sympathy has been awakened in behalf of a class, the fruits of whose industry have borne so frightfully inadequate a proportion to their toil and necessities; the voice of the philanthropist, the masculine denunciation of the public organs, the pitiful wail of the inspired Poet, the earnest combination of the charitable Gentlewomen, alive to the privations and struggles of poor Sempstresses, have all conspired, but, alas! with slight effect, to mitigate the sufferings generated by the pursuit of a calling, in which the maximum of labour realises but the minimum of reward.

Emigration has rescued a few from the miseries of their position, and the extension of the fields of employment for females has led to the adoption by others of professions of a less prejudical character then that of the dressmaker; but as long as there is a demand for needlework, and that demand can be supplied by human hands, there will be numerous disciples of the trade, because it is learnt with ease, and can be followed at an early period of life: its ultimate effect upon the eyes, the influence of the position it necessitates upon the human form, the consequences to the lungs and the general health, of the confinement in crowded rooms or small and close apartments which must be the portion of the Sempstress, all are forgotten in the pressure of the moment, and the eager desire to eat the bread of industry. Hundreds of thousands at this moment toil in unwholesome localities at a pernicious avocation for many hours a-day, for wages that barely tend to hold life and soul together, neglecting, in the ardour stimulated by want, the adoption of pursuits of a more profitable and health-promoting character.

In this view—and who shall say that it is false or exaggerated—the Sewing Machine is calculated to prove an incalculable blessing to the needle-plyers in Great Britain, for it must ultimately supersede their devastating profession.

But the Sewing Machine is an American Invention. Machinery is the grand necessity of the United States, for population has not augmented to a point which renders the number of needlewomen adequate to the demand upon their industry. America almost denudes Germany of her Sempstresses, and still production falls infinitely short of her requirements. She is thus compelled to employ Steel and Iron to do the work of humanity, for what is machinery but a mimicry of the physical faculties, multiplied to an almost indefinite extent? And perhaps there is hardly an instance on record, of a more simple application of that principle, than the Sewing Machine presents. It can do the work of between thirty and forty hands; it can accomplish 500 stiches in one minute.

An example of its great rapidity of motion may here be quoted:—The Messrs. Nicoll, of Regent-street, whom it will be afterwards shown, have been the chief introducers of the Sewing Machine for practical use in England, were directed to exhibit the Machine, and specimens of its productions, to the Royal Family of Belgium, when recently staying at Windsor Castle, and not having a specimen completed that they deemed to be worthy of the occasion, one or two Machines were set in motion, and that which was but shapeless cloth, was, within four hours from the receipt of the command, on the road to Windsor in the form of a travelling wrapper, containing a greater number

of stitches than one operative could, in the old manner, have produced in three weeks.

I do not wish it to be supposed that I demand credit for originality in the present work. To have improved upon the ideas of others—to have overcome difficulties which to them appeared insuperable—to have discovered the vital defect of all previous attempts—and to have finally brought the machine into practical and profitable operation, forms the foundation of my claim to your attention. The first attempt at stitching by machinery was made by Mr. Ellis Howe, of Boston, in the United States. He conceived the principle of a stitch made by the use of two threads, worked by means of one needle, and a shuttle; but after the expenditure of a great deal of money it proved an utter failure, for want of practical mechanical means for working the needle and shuttle. This was in the early part of the year 1846. From that time until 1851 numerous attempts were made to remedy the deficiency, attempts as honourable to the ingenuity of their authors as they were unfortunate in their results. Collecting specimens of these inventions, I proceeded to examine in what respect they failed to fulfil the necessary conditions, and, detecting their deficiency, at length contrived to produce a practicable working machine, and offered it to the public. My exultation received an immediate check. The machine was alleged to be an infringement upon the invention of Mr. Howe, inasmuch as his machine consisted in the application of a shuttle in combination with a needle for the purpose of sewing and stitching, and I was advised that it could not be brought into practice until the expiry of his patent. Thus the law which was passed to protect for a time the monopoly of an inventor, became in this instance a clog to improvement. It rejected a desideratum to conserve a nullity. Baffled in this instance, I now determined upon carrying out a plan for stitching upon quite a different principle, doing away with the shuttle entirely, and forming altogether a different stitch.

Aided by the advice and suggestions of eight or nine American gentlemen, I was enabled to give substantial operation to this new invention, and, that I might not again encounter the opposition offered on patent grounds in America, I brought it over to England. The favour with which it was received led to the foundation of a company under the designation of the "Lancashire Sewing Machine Company." The progress of the invention was, however, slow and tedious; it suffered from a certain amount of interference with labour, excited jealousy and apprehension, and manufacturers dreaded to experimentalize with what might raise a rebellion in their establishment, without giving them a corresponding advantage. At length the matter was taken up by the enterprising and prosperous firm of Messrs. Nicoll, the clothiers already alluded to, and the practical uses of the machine are now almost universally recognized. The Messrs. Nicoll knew that Mr. Speckmen, of Belfast, who introduced one of the machines into his establishment, was at first assaulted and placarded, and his life placed in danger by his workmen, but they were also aware, that whereas the same person previous to the introduction of the machine had only been able to employ seventeen hands, he was now, after purchasing four more machines, enabled to give employment to about 150 hands. Balancing the chances of personal danger and unpopularity among the working classes, against the certain benefits derivable by the public and the operative from the uses of the machine, the Messrs. Nicoll decided for the adoption of my invention.

I will now proceed to describe the machine itself, and the manner in which it works.

STITCHING MACHINE.*

*The Society is indebted for this woodcut to the proprietors of the *Illustrated London News*.

It is composed of a flat iron surface, about twelve inches square, resting upon four legs of substantial make and form. From one side of this surface an arm rises erect to the height of about ten inches, and then passes over to the opposite side. From the extremity of the arm descends a moveable bar, to the bottom of which is fixed a needle, the eye being about half an inch from the point, and on the top of the arm is fixed a reel or bobbin filled with silk or other thread. Fixed to a main shaft is a wheel turned by a handle, which also can be worked by a treadle, or steam engine, that gives motion to a lever within the arm, and which moves the vertical needle up and down. Beneath the visible surface, or base, is a second reel of thread supplying another needle, which instead of being straight is circular and works horizontally, and consequently at right angles to its stitching companion, which descends from the arm. Supposing the thread to be passed through the eye of each needle, and the apparatus set to work, the process is thus performed: The vertical needle descends and passes through the two pieces of cloth to be united, carrying with it the thread to perhaps half an inch below the under side of the cloth; as the needle rises the thread is left behind in the form of a noose, or loop, through which the horizontal needle passes; the horizontal needle instantly reversing its motion, leaves a loop into which the vertical needle descends. Both needles thus progress, making a series of stitches, each stitch being quite fast, even should its neighbour be severed. More than five hundred stitches can be made in this manner in one minute. The closeness and tightness of the threads are regulated by a screw, and as each stitch is of equal tension a great advantage is secured in the regular appearance of the work. The length of the stitch, by turning a small nut, can be increased or diminished to any degree of fineness, and perfect uniformity secured. The cloth to be worked upon is adjusted by an attendant, who with one hand turns the wheel, and with the other guides the cloth forward after each stitch. Sometimes two hands are employed, a girl or boy giving rotatory motion to the wheel, while the other attendant regulates the movement of the cloth. The operative by his actions can cause the sewing to be straight, angular, or circular.

It will be obvious that, upon the principle of sewing herein applied, an infinite variety of work can be completed; from delicate cambric work to the sewing of the hempen cloth of which sails, sacks, and bags are composed, everything is germane to the machine. In the operation of the tailor and the sempstress it is of the greatest importance. Trousers and shirts are made with extraordinary rapidity. It has been proved over and over again that, excepting in the construction of the button-holes, a pair of trousers can be fashioned and stitched in less than an hour. And of what vast importance in the affairs of life is this economy of time? A vessel in a gale of wind, or a sudden squall, has her sails rent and tattered. The sailmaker's hands could not supply their places in many days. The machine refits the yards in a few hours. Thousands of bags are needed for erecting fortifications and batteries. The exigency of the service demands the instant raising and equipment of a military force. The contractor for army clothing would require weeks for the production of a thousand of loosely manufactured suits. The machines could equip an army in a day or two. A person has a sudden occasion to leave England for India, or Australia, or China, within twenty-four hours. He needs an outfit of clothes; the machine promptly ministers to his requirements. The cases might be multiplied a hundred-fold. And how many articles to which sewing is now a stranger, may be suggested by the appearance of a process of manufacture hitherto unknown, if not unimagined? *Parva componere magnis.* The railway has given an impetus to travelling—has created new towns and villages—enlarged the demand for literature, and excited new tastes and desires. In like manner the sewing machine may engender fresh fancies in personal decoration; and, better than all, impart to the poor the means of obtaining necessary articles of clothing.

I have said that the general application of the sewing-machine will not have any material influence on the immediate interest of the artizans—that is to say, to the extent of depriving them of the means of subsistence. The machines will, in the first place, require the assistance of one or two hands, thus converting the toilsome labourer into an operative, whose duties will be of an easy and by no means a health-destroying character. The vastly-increased quantity of articles partially produced by augmented rapidity of stitch will create a demand for a greater number of hands in cutting and in finishing; for the machine can neither give a form to the cloth to be sewed, nor work button-holes, nor put on buttons. But, that one fact is worth a thousand conjectures, take the example offered by the very house mentioned by me as giving the earliest encouragement to this machine. They, I am informed, are accustomed to employ, in various ways, a number of operatives, usually exceeding one thousand, and not one has been discharged through the introduction of the machine, but many have been employed in a more profitable and healthy manner.

DISCUSSION.

Mr. Judkin here showed, by means of a board perforated with holes, and two pieces of cord, how the stitch was made, it being a combination of loops which gave on the under side of the work a "chain" stitch, and on the upper the ordinary-looking "stiching" stitch.

The machine was also put in motion, and did its work with great rapidity.

The Chairman, in inviting discussion, stated that the paper opened up two or three questions of political economy which it would appear to be hardly necessary to discuss in the present day, were it not for the fact that the operatives appeared, from time to time, to forget that the introduction of machinery had always, after a short time, proved advantageous to themselves; for though in the first instance it might appear likely to displace labour, yet, from the increased stimulus that was given to production, and the cheapening the article produced, a demand arose by which, though the same operatives might not be employed, others obtained work at good wages, and added to the wealth of the country.

Mr. Powell wished to know, supposing one or two of the vertical stitches of the work were to be cut or wear through, what effect it would have in causing the others to run.

Mr. Judkin could not say exactly, but certainly very few would run—not so many as in ordinary stitching.

The Secretary wished to mention that he had received from Mr. Douglas some specimens of stitching by another machine, of which, however, he had no explanation beyond this—that it was called a "back-stitching" machine, and only one thread was used.

Mr. Heal wished to know on what data it was stated the machine would do the work of 30 or 40 women. He could bear testimony to the advantages of the machine, but his experience did not lead him to anything like such a difference. He should therefore like to know, in making the calculation, what kind of work was referred to.

Mr. Judkin replied, in sewing the seams of garments, such as coats, trowsers, &c., where close and fine work was required. It was not pretended that it would make button-holes or put on buttons, neither would it earn the same proportion with regard to cheap work, such as bags &c., where long stitches were taken by the workwoman, whilst the machine gave them short and close stitches.

Mr. Heal said that he employed the machine in making mattresses, but he did not find it would do more than the work of two or three women.

Mr. Stocqueler had been round to the shops of some most eminent shirt-makers, and asked them what they paid for shirts—how long it would take to make the buttons

holes, and how long the body of the shirt. They replied that the button-holes would take an hour, and a good shirt two days. The machine would make thirty or forty in that time, and if the consumption increased in the same proportion, the women would be fully employed in making button-holes, and receive better wages than at present.

Mr. HEAL thought the machine would be of great advantage to the needle-women. The machine required great skill to manage it, and he believed it would have the effect of raising the price of labour.

Mr. DAVIS would not go the length of saying that the paper exaggerated the advantages of the machine, but he had great doubts whether it would do all that was represented. He employed between two and three thousand sempstresses and tailors, and owing to the demand which had grown up for the finer and better class of clothing, there was a difficulty in getting hands for the coarser kind of work fitted for exportation—such as moleskins, elveteens, corduroys, &c. He had therefore watched the machine with great interest, ever since its introduction into this country; and he had lately obtained one himself, which he had placed in the hands of most skilful artizans, but it did not work satisfactorily, though he could not say whether the fault was in the machine or those who worked it. He did not say this with a view of throwing cold water on the machine, as he believed, if the difficulties were overcome, it was likely to prove a great help to the labour market, which, owing to the luxury of the times and the demand for the fine articles of clothing, was very badly supplied with persons to do the coarser kinds of work. The trial shown them that night was made with silk, which would bear great friction, far greater than cotton. He did not think they could with cotton make five hundred, or even two hundred and fifty stitches a minute, as the difficulty he had to contend with was its continual snapping, owing to the friction—and it had a similar effect with thread. He thought that perhaps the difficulty might be in some measure counteracted by the alteration of the angles at which the reels of thread were placed, so as to reduce the friction.

Mr. JUDKIN said, that he could produce testimonials from more than 100 persons who had used the machine of its efficiency, those who had originally purchased one having increased their number to two, three, four, or five; and in the Sing Sing prison, at New York, it was successfully and economically worked by convicts. The fact was, Mr. Davis had only had the machine three or four days, and had been offered to have somebody sent him to instruct parties in its working, which, however, he had not required. He was glad to receive all suggestions for the improvement of the machine, and, whenever feasible, he would adopt them. But the fact was they could use the finest thread, much weaker than could be used by hand. By hand the thread went through and through with every stitch taken, causing great friction and loss of strength, which rendered recourse to waxing necessary. With the machine it was not so. The thread only entered the cloth once, and then remained; whilst the stitches were so regular in regard to their tightness, that comparatively little pressing was required. The cause of the thread snapping was this, they had under the machine a small India-rubber pulley, attached to a metallic spring, which held down the first loop whilst the second was passing through it to complete the stitch, and if that were not properly adjusted there would be too great a strain on the thread, which would consequently break. There was a gentleman in the room, who supplied cotton to some American houses, who could speak to the efficiency of the machine, and to the sails of the *Great Republic* having been made by it.

Mr. WALDO said, that from information he had received from America, he could speak to the sails of the *Great Republic*, which were 28,000 feet square, having been made by a similar machine to that on the table, and he was assured that two machines made one suit of the sails in six days, which could not, in the ordinary way, have been prepared under 1200 days.

Mr. HEAL could easily understand why, if Mr. Davis had only had the machine three or four days, it did not work to his satisfaction. It took nearly a month before he (Mr. Heal) could get it to work satisfactorily, from the nicety of manipulation required in its adjustment.

In reply to a question, Mr. JUDKIN stated that the article being made was forced forward, as the stitches were made by means of a lever acting on a crank, which could be so adjusted as to change the length of the stitch from one-fourth of an inch to fifty in an inch.

The CHAIRMAN had been requested to ask whether the machine would make the stitch in harness leather, such as he held in his hand, as well as in cloth.

Mr. JUDKIN replied it would make a stitch in the leather, but not the same. He had a machine preparing which would make the same stitch, and only use one thread.

Mr. ELLIOTT thought that, as regarded harness work, this machine could only do a very small part, and he was afraid that the stitch would not be sufficiently strong for the purpose of bearing the strain in the dragging of carriages. He thought if they once obtained a hold of the thread, the whole of the seam made by the machines could be run out.

Mr. DAVIS, in justice to Mr. Judkin, must bear his testimony that when the seam was once made, it was stronger than that made by hand.

Mr. JUDKIN did not say that the machine on the table was adapted for harness making, though he would shortly have one out which would be so; but the thickness of the material would make no difference in the working, all they had to do being to put in stronger needles. As regarded the running of the seam, he might observe, if they took a stocking, cut off the toe, and obtained a hold of the thread, they might ravel it all out,—so also, if they obtained hold of the thread, they might draw out his or any other seam. If, however, there were a hole in the stocking, it did not ravel out, neither, if they broke one or two stitches in his seam, would it have any material effect on the rest.

Mr. ELLIOTT thought that though it could not be said the machine would do everything, it would be a great practical blessing to this country. He believed it required a real artist in sewing to make a button-hole, and that there were as few really good workers as really good writers. The object which it appeared to him would be effected by Mr. Judkin's machine would be the putting down of the low, coarse, and cheap labour, and temporarily threw out of employment those who could only get 6d., 8d., or 10d. a day for their work. A great deal had been said about the badness of the pay of this class of needle-women, but he believed they had been generally paid as much as they were worth—as their work was of such a nature that no good house-wife would have it in her house. It would be far better for this class of persons to be forced to look for some out-door employment, where, if she earned no more, she might get a little strength in her limbs and a little colour in her cheeks. A large number of these sempstresses were married, and, however strange it might appear to say so, he believed that it would be for their own benefit and that of society, if they were thrown out of employment altogether—as the husband would then bring home more of his own earnings, and the wife would be properly employed in economising the money. The best state of society was that in which the woman did not earn any money, but where the husband worked, and the wife was employed in making the 8s. or 10s. go to the utmost extent in making a comfortable home, and in exercising her natural talents in the development of domestic virtue and economy. He considered Mr. Judkin, and the inventors of all similar machines, as benefactors of society; and if any one could invent a washing machine which would take in the dirty linen at one end and send it out ready for wear at the

other, he would be deserving of the highest honours, as there was no worse kind of labour, or one more subversive of all domestic happiness, than washing.

The CHAIRMAN then moved a vote of thanks to Mr. Judkin for his valuable paper, which was unanimously passed.

The Secretary announced that, at the meeting of Wednesday next, the 25th instant, a Paper would be read "On Laws relating to Property in Designs and Inventions, and the Effect of such Laws on the Arts and Manufactures," by Mr. Thomas Webster, M.A., F.R.S.

CONFERENCE ON STRIKES AND LOCK-OUTS.

WITH reference to the proposed conference, the Council desire to make it known that the position taken by them is strictly neutral,—no arbitration or interference being contemplated on their part.

The Council also wish it to be borne in mind that the discussion will be raised on questions involved in Strikes and Lock-outs generally, and not upon the facts or merits of any particular strike; and the invitations to attend the meeting go out to all parties generally, and are not confined to any particular class or opinions.

The Council have come to an unanimous resolution not to express any opinion, either individually or collectively.

PARTNERSHIP AND LIMITED LIABILITY.

At a time when the subject of strikes and lock-outs is exciting the attention, not only of the commercial world, but of all classes of society, and by many it is considered that the existing law of partnership in this country, preventing the operative or small capitalist from readily investing his savings in mercantile undertakings, has an important bearing on the question; it will not be thought out of place to call attention, shortly, to that species of partnership which exists in France, and known by the name of *Société en commandité*. Partnerships of a similar kind exist in many other countries, including most of the American States. The following description of these partnerships is taken from an early edition of a work by Mr. C. Wordsworth, published in November, 1841.*

"*Commandité* associations consist of two or more individuals, of whom one or more undertake the management, and are held indefinitely responsible for all engagements, as in the case of ordinary partnerships; and the others are mere shareholders, responsible only to the amount of their contributions, either paid-up, or contracted to be paid (*qu'ils ont versé ou promis de verser*) into the joint-stock of the association. The first, called *commandités*, may be designated managing partners; the second, called *commanditaires*, non-responsible shareholders, or simply shareholders.

"When there are several responsible partners (*commandités*), the association, as between them and the public, is an ordinary partnership; but, as between the non-responsible shareholders and the public, it is a privileged company.

"It is an essential condition of this species of trading association, that the non-responsible stock-holder (*commanditaire*) takes no part in the management. If he perform any act of management (*acte de gestion*), his responsibility ceases to be confined to the amount of his contribution; he becomes liable indefinitely for all the engagements of the association; in other words, he makes himself a responsible partner. He ceases to be a (*commanditaire*, and becomes a *commandité*.

"This rule is without exception. A shareholder cannot be employed by the association, even by power of attorney, and it seems to be a corollary from the same rule, that a clerk or servant cannot become a shareholder without incurring the full responsibility of a managing partner.

"In order to constitute a *commandite* association, it is necessary that in the deed of association it is agreed that such and such of the associates be excluded from management, and that their risk be limited to the amount of their respective contributions. According to Pardessus, the ablest French writer on commercial law, this need not be stated in express terms, no other explanation being necessary than that such and such are non-responsible shareholders; that expression being deemed sufficient without the periphrasis which it would otherwise be necessary to employ.

"The law of France does not require that the deed (*l'acte*) of association be published. It may, like an ordinary deed of partnership, be executed in private, but it is imperatively necessary that an extract be published, stating that among the associates there are so many shareholders of limited responsibility, but without indicating their names. The 'extract' must also announce in what sums or in what species of property (*objets*) their contributions consist, and whether they have been paid up or still remain to be paid up. If the publication of the extract be neglected, the association is deemed an ordinary partnership. (*Pardessus, tome* 4ème, p. 118.)

"This annunciation is deemed by Pardessus of the highest importance, as it is the only mode of informing third parties who deal with the association that, in addition to the personal responsibility of the managing partners, the capital of the association is composed of such and such sums, of which a creditor can demand payment of the shareholders, unless these latter can prove that they have already paid up the whole amount of their contributions. A false annunciation is deemed an act of swindling (*une escroquerie*), and is punishable as such.

"The contribution of a shareholder may consist of secrets of arts and manufactures, but their adoption must not in any way be accompanied by acts of management. This prohibition, however, does not extend to transactions between a shareholder acting in his individual capacity on the one part, and the association acting by its managing partners on the other.

"Thus, C., a merchant, may be a shareholder in a *commandité* association, of which A. and B. are the responsible managing partners. A. and B., acting for the association, may buy from, or sell to C., without in any way affecting the rights or immunities of the latter, as a non-responsible shareholder. Moreover, as a shareholder may sell goods to, and so become the creditor of, the *commandité* association to which he belongs, so also may he lend money thereto.

"Although acts of management are thus strictly forbidden to the shareholder, this does not preclude him from taking a part in the deliberations of the association. He may audit accounts, determine what dividends shall be paid, whether instalments shall be called in, and even what engagements or speculations shall be entered into. All that is prohibited to him is *management*. The reason of this distinction is obvious. An act of management would create an impression with third parties that they had the security of his responsibility; hence the law very properly attaches responsibility to such an act. An act of *control*, on the other hand, has no reference to third parties, but merely regards the security of the shareholders; hence the law as properly permits such an act.

* The Law of Mining, Banking, Insurance, and General Joint-stock Companies, &c. By C. Wordsworth, Esq., Barrister at Law. Second Edition, 1854.

"For the same reason the name of a shareholder cannot form part of a firm or title. Were it so third parties would have no means of distinguishing between shareholders and managing partners, and *commandité* associations might obtain an undue degree of credit. The managing partners, however, may add the words *and Company* to their own names, as that merely indicates that they have associates. Thus a *commandité* associate may exist between A., B., and C., whereof A. is the sole manager. The object of calling the firm A. and Co., is merely to announce that A. is not alone; but whether his associates B. and C. be ordinary partners or mere shareholders, depends on the fulfilment of the legal conditions already specified. It may not be out of place here to remark, that he who makes use of the words "and Company" (and Co.), without having an associate, is deemed guilty of fraud or swindling (*coupable d'escroquerie*).

"If the capital of an association be divided into equal shares, such shares as are held by non-responsible shareholders are deemed to be transferable; but where the capital is not so divided, a shareholder cannot transfer his interest without the consent of his associates. A managing partner cannot in any case retire without the consent of his associates, nor does his retirement relieve him from responsibility to third parties, if the association subsequently fail, being insolvent at the time of his retirement. This is only a particular case of the general rule whereby the managing partners of a *commandite* association are considered with reference to third parties as members of an ordinary partnership.

"The shareholder, we have seen, is responsible only to the amount of his contribution. For that amount he may be sued by a creditor, but he is relieved from responsibility by proving that he has paid up all instalments. If he cannot do this the creditor obtains judgment to the amount which still remains to be paid up.

"A question has arisen in the French courts, whether a shareholder may not be compelled to refund any dividends he may have previously received. Pardessus says there is no absolute rule in this case, but it must be decided 'by circumstances.' This vagueness is certainly a great defect, common enough in the English law, but quite unworthy of the *Code de Commerce*. It appears to me that to require that actual profits which have been drawn and expended be refunded, destroys one of the chief advantages of the law of *commandite* associations. The great utility of this species of association consists in its tendency to promote the aggregation of small capitals which cannot be employed individually. Now, if shareholders were liable to be called upon to refund the consumed profits of a long series of years, and thereby to be reduced to beggary, the inducement to embark capital in such associations would be destroyed, and the rule of law become a dead letter. Pardessus, who is extremely cautious in giving a decided opinion where the law is vague, contents himself by saying: *c'est donc d'apres les circonstances les clauses rendues publiques, et la bonne foi des opérations* (each of which considered as guides to decision, may mean anything which the tribunals please), *que les tribunaux pourraient se décider dans une question si délicate.* Under any circumstances there should be positive enactment, and we venture to think it should be *against* refunding actual profits. At the same time, dividends paid out of capital, and not out of profits, should not merely be refunded, but should be declared to be fraudulent, and should be punishable as such. The punishment should extend to shareholders, because the declaration of a dividend requires their sanction.

"Out of the provision which permits a shareholder to lend money to, and thereby become the creditor of the association to which he belongs, a difficulty appears to have arisen. By collusion between the managing partners and shareholders, a part of the contribution of the latter has been disguised under the name of a loan, in order to facilitate its withdrawal in case of failure, to the prejudice of creditors. This, however, does not appear to be a very serious difficulty. The law itself contains within its bosom an adequate remedy. The amount of the contributions of the shareholders must be published at the time the association is declared. If this account afterwards turn out to be palpably incorrect, it would be an 'annunciation proved to be false,' (*une énonciation dont le fausseté serait prouvée*), and, as such, would be punishable by the penal law.

"A very simple remedy for this and some other difficulties, would be the publication of the lists of shareholders with the amounts for which they might be responsible. By means of published lists, clerks might be permitted to hold shares, and the association might be permitted to avail itself of the services of any competent shareholder without the least risk of generating deception in either case. A publication yearly or half-yearly, or, what would be better, a simple registration, would also absolve shareholders who have disposed of their shares."

It appears that the principles of this description of partnerships were adopted by the Irish parliament, which passed, the 21 and 22 Geo. III., c. 46, the *Anonymous Partnership* Act. This act does not seem ever to have been acted upon, probably because it was clogged with two conditions,—first, a limitation of the partnerships to fourteen years; and, secondly, that a subscriber should pay up the whole amount of his shares within twelve months. Further information on the subject of partnerships with limited liability will be found in a Report published in 1849, by the Society for Promoting the Amendment of the Law.

THE WORKING CLASSES OF NASSAU.*

The pamphlet referred to in the heading to this article, is the result of a well-spent leisure in the Duchy of Nassau, last summer, and will be found to contain a mass of information, interesting to all who study the effect which peculiar institutions and local circumstances must produce on industrial progress.

The author says:—

"My letters were at first intended for the Society of Arts' weekly Journal, and indeed, the greater portion of Letter I. appeared in No. 31 of that periodical; but after I had fathomed my subject, and when I was enabled to appreciate thankfully the valuable assistance most readily afforded me by my German connexions and friends, it became evident that my papers would be more adapted for quiet consideration, or reference in a pamphlet form, than suited for cursory perusal in detached fragments. It was accordingly decided that they should be printed in the present mode, for distribution to Members of the Society and others taking an interest in industrial questions, and for being offered for perusal to the Working Classes themselves, through the medium of the Institutions in Union, now numbering upwards of three hundred, and affording a most convenient means for promulgating whatever may serve to promote the intellectual development, and consequently to improve the physical condition, of the British artisan."

He avoids giving opinions of his own. Contenting himself with a simple delineation of the *facts* of industrial life in Germany, and expresses a hope that further information respecting foreign countries may be afforded "not only by Englishmen residing abroad, either in an official capacity or otherwise, but also by the numerous and mostly intelligent, yet hitherto rather unproductive, tribe of English tourists."

He hopes to see adopted during the coming winter ses-

* Letters on the Condition of the Working Classes of Nassau, being a Report on their Intellectual and Technical Training, their Earnings and Household Economy, and the Institutions Established for their Benefit. Addressed to the Council of the Society of Arts. By T. Twining, Jun.

sion, arrangements by which the Council of the Society of Arts may induce many travellers to offer their services to the Society, for acting under instructions which would greatly facilitate inquiry, and secure uniformity of purpose. In each country, those industrial features will of course be most dwelt upon, which are most prominently developed, most different from what we see at home, or most commendable for imitation.

"The Duchy of Nassau is not a manufacturing country —the produce of its manufacturing industry is not to be compared to that of its vineyards, or to its mineral wealth —nor does it possess technical institutions like those described by Dr. Playfair in his valuable account of the training colleges of Germany; but its system of elementary education, its regulations concerning the apprenticeship of artisans, and the examinations they have to undergo, and the various means which its remarkably centralised administrative system affords for influencing beneficially the condition of the poorer classes, are well worthy of consideration. On most of these points, and also as regards the mode of living of the working population (*proletariat*), their wages, expenditure, and resources, it is a very good sample of the south-western part of Germany; and in many respects it will be found to present a very convenient standard of comparison to those who may undertake the review of the neighbouring States."

With respect to primary education it appears that "in the Duchy of Nassau, as well as in other parts of Germany, the education of the industrial classes is provided for by a complete system of elementary schools, extending to the smallest village, under the direction of Government. All children from six to fourteen years of age are obliged to attend these schools, unless they frequent some other institution. No child is allowed to remain without instruction. * * * The names of children failing to attend are noted down, and their parents subjected by the Burgomaster to a fine, which is increased on recurrence of neglect.

"The children learn very quickly to read by a kind of Phonetic system.—In what is called *Anschauung's Unterricht*, the sense of vision is used in a variety of ways, for assisting the memory, and facilitating the expansion of the intellect.

"On leaving school at fourteen years of age, the scholar must be able to read German, in German and Roman type, fluently, and with proper emphasis and expression; must be skilled in the rules of common arithmetic; be able to write compositions on subjects of business, with good orthography; and be possessed of some knowledge of geography, natural history, geometry, &c., &c.

"The charge to the parents for this instruction is from one to four florins (or 1*s.* 8*d.* to 6*s.* 8*d.*) per year, for each child, which amount is paid into the treasury of the parish. The latter provides, under control of Government, for the salary of the master, as well as for school requisites of every kind, and also for the building of the school-houses. Poor communities receive subsidies from the Government treasury.

"There are two seminaries, or primary schools, for the education of schoolmasters—one Protestant, at Usingen, which, according to the last reports, contains sixty students; and one Roman Catholic, at Montabauer, with sixty-four students—in which young men from sixteen years of age and upwards receive, at the expense of the Government, a thorough general and special education, including music. At the expiration of three years they have to pass an examination; after which they are appointed school-assistants, with a salary of about 150 florins, or 12*l.* 10*s.* sterling, which, after two years, is somewhat increased. After another year or two, they are installed as schoolmasters (*Lehrer*), with a salary of 200 florins, or 16*l.* 13*s.* 4*d.* Their subsequent promotion, and consequent increase of salary, which reaches up to about 700 florins, or near 60*l.*, takes place according to seniority.

* * * * "One of the most interesting features in the educational system of this country, is the peculiar smoothness with which it slips over an obstacle deemed almost insurmountable in England, viz. the diversity of religious persuasions.

With respect to industrial schools it seems "that within the last eight or ten years a notable beginning has been made, under the direction of the *Gewerbe-Verein*, a Society very similar in its attributes to our Society of Arts," with government assistance to establish "in various parts of the Duchy, what are called *Gewerbe-schulen*, or Industrial Schools, consisting of—

"*Firstly*, Evening Classes (*Abend-schulen*) held in winter time, for the purpose of giving young artisans and others an useful complement to their elementary education, in such branches as commercial reckoning and correspondence, and practical geometry.

"*Secondly*, Sunday Classes (*Sontag-schulen*), intended for departments of study which are not so well taught in the evening as by daylight, and held on Sundays for the benefit of young men, chiefly apprentices, whose occupations would not allow them to attend conveniently during the week.(a) They comprise the various branches of drawing required for the industrial trades, and geometry applied to the arts of design."

There are at present twenty-five of these schools with an aggregate number of about two thousand students. There is also a Modelling School at Wiesbaden, attended at present by between thirty-five and forty students.

"7419 florins, or about 618*l.* sterling, have been expended in the last financial year, for founding and maintaining the above Schools, whereof about two thousand florins were furnished by the Society, and four thousand florins were covered by a Government grant; the remainder was supplied by the localities."

The author then proceeds to describe the apprenticeship system, a necessary preliminary to the exercise of any trade. Its term extends from 3 to 4 years; the sum paid to the master varies from 2*l.* 10*s.* to 16*l.* according to the nature of the trade. On passing an examination he is admitted to the rank of journeyman, after which he travels for a time, thus having the opportunity of obtaining practical experience in his calling and a knowledge of the various methods and contrivances used in different localities.

Before he can become a master, certain important legal and other steps must be taken, but in every case, he is required to accomplish single-handed, for strict inspection by the *Prufungs Commission*, some model piece of workmanship, sufficient to show, not merely a moderate amount of skill, as when he was a candidate for journeymanship, but his thorough knowledge of the *arcana majora* of his calling. If he can follow up the display orally, with theoretical evidence, he is entitled to be admitted forthwith to the Honourable Company of the Masters of the Trade.

A lad who cannot, or does not pass his apprenticeship examination, becomes at once a day-labourer.

Mr. Twining then enters into an elaborate account of the earnings of Tradesmen and master operatives, and the wages of the journeymen day-labourers, and of servants, their terms and condition of labour. The expenses furniture, food, habits, clothing and fuel, are carefully detailed and described, whilst the last letter is devoted to the resources at the command of the population.

For the whole of these details the reader must be referred to the work itself.

The author has deposited for inspection at the Society of Arts educational samples, to show the proficiency of the children at the Wiesbaden elementary schools, and pamphlets, and printed or manuscript documents, in German, respecting the subjects to which the letters relate, and other collateral topics. Persons desirous of translating any portion of them for publication, are invited to address

(a) This plan being open to serious objections, is not to be considered as settled.

an application to that effect to the Society's Secretary. It should be stated that a certain number of copies of this pamphlet have been placed at the disposal of the Society for distribution, and will be forwarded to persons in any part of the country, connected through their pursuits with the intellectual development of the people, or otherwise taking a special interest in the improvement of the working classes, on transmission of a request stating the claim, and accompanied with six stamps to pay the postage.

Home Correspondence.

STRIKES AND LOCK-OUTS.

SIR,—The Society of Arts and Manufactures have very fitly placed at the disposal of those interested in the present disputes their rooms and appliances as a neutral ground whereon to discuss the questions at issue on their merits, with a view to their possible adjustment. The parties concerned may, or may not, take advantage of this in verbal discussion, and, if they do not, will waste an opportunity. Meanwhile I will, with your permission, endeavour to discuss the question in your pages.

Being neither employer nor employed, I consequently may be supposed to be unprejudiced. I have in my time been an employer of many men in many varieties of work, in more than one country, and am therefore enabled to judge of the qualities, aptitudes, and habits of workmen as well as their defects, and can bear testimony that the latter are mostly a result of want of instruction, and not of wrong purpose. Disagreeing in some things with employers, and in some others with workmen, the chances are that I shall make opponents on both sides. Be that as it may, I shall speak my mind freely, as a public duty, and do not say with the sage of old, "Strike, but hear!" but—hear me patiently, and strike afterwards as much as you please. I will, therefore, put on paper as concisely as possible, the statement of the case at issue, and the political economy of the matter, with my views of the possible mode in which the present dispute may be put an end to, and further disputes obviated, with a greater amount of profitable production to the public, to the employers, and to the employed.

There are three views to be taken of this question—the legal, the commercial, and the moral.

As regards the legal, there can be no doubt that employers have a right to settle amongst themselves individually, or jointly, what wages they may choose to pay for work. And, on the other hand, the employed have a right to determine, individually or jointly, at what rate they choose to sell their labour, provided no control or compulsion be exercised over any individual.

This is simply in conformity with the doctrines of political economy—to buy in the cheapest market and sell in the dearest.

To put their different views in practice, it is essential that surplus capital should exist as a maintenance fund—to prevent compulsory buying or selling labour, under the pressure of necessity.

The employers possess this maintenance fund or capital—individually. The employed rarely possess it individually, and, therefore, the advantage in the mutual labour market must rest with the employer.

To meet this difficulty, the workmen unite and subscribe to form a joint-stock fund, wherewith to maintain themselves while resisting the lowering their wages, or while aiming at raising them.

But, it is clear that this maintenance can only apply to a very small number out of work, while the great majority continue in work.

If, therefore, the whole body of workmen were to strike at once, there would be no maintenance fund whatever on the part of the workmen.

To meet this case, the majority continue in work, and commence a strike against an individual employer, or a town of employers,—the strikers being maintained by the general body.

This employer or town being obliged to yield, will agree to pay all the wages that can be afforded, and possibly more than can be afforded, for a time.

The strikers may then pursue the same policy with another employer or town, and this process may go on till the general body of employers, taking the alarm, overcome their competitive feeling with regard to each other, and make common cause, by closing their factories to such an exent as to cut down the issue of wages, and the source of the strike-fund.

If the strike were to exist only in cotton manufactures, and all the workmen in other manufactures were to contribute to the strike-fund, the contest might be prolonged.

But then the employers in other manufactures, dreading the same result in turn, might take up the contest, and it might go on till so large a number had to be supported by the comparatively few workers, that the whole of the workers must break down, with the simultaneous ruin of many employers, and the retardation of English progress—possibly the driving many trades to other countries.

Now it is certain that in a national point of view employers and employed have only one interest, and that if, out of the division of the profits of a manufacture, a dispute arise between employers and employed. the profits and the wages-fund will infallibly be lessened.

In conducting a manufactory a certain portion of money must build the mills, and buy materials, and on this interest must be paid, or the mill would not be built. Another portion must go for profits, or the employers would not carry on business. The remaining portion goes for wages to the employed.

The question at issue is, that those employed assume that the employers award too little to the wages share, and too much to the profit share, which is denied by the employers, who say they give all they can afford.

It is clear that the employers have the power of knowing what they get. The employed can only surmise, unless the employers show their books, which, like all other merchants, they are disinclined to do, and, unless we suppose the workmen to be good accountants, it does not follow that they would be satisfied that the accounts were genuine.

But the employers say that they find the capital, and the risk, and that they do not choose to admit the workmen to a knowledge of, or conference with, their concerns.

The result is a kind of war against each other's finances, destroying national capital, and giving the victory—not necessarily to the right, but to the most powerful. And the victory is not a peace. The employed go to work again, but with a resolution to try again at the first opportunity, believing that they have been beaten—not by natural laws, but by unfair tactics.

Nor can this condition of things be altered. The employed must do the bidding of the employers, implicitly, so long as they are paid by daily or piece wages—the latter being in reality only daily wages—calculated so as to vary the rates between first-class and inferior workmen.

Still the employed have a perception that this is not to be their final condition, but that they must arrive at some process whereby their earnings may rise in graduated scale with prosperous times without depending on the absolute will or mere conscience of the employer. They have occasionally talked of claiming a share of profits in addition to wages.

This the employer thinks most unjust, as they run no risk, in addition to the utter impracticability of any such arrangement under the present law of partnership.

And in this the employer is right. The employed must save their wages and acquire a capital to risk before they can be entitled to contingent profits as well as to

certain wages. The numerous employers who have risen from the condition of workmen, have passed through this ordeal, and so must others. And in addition to this, the employed must acquire the knowledge and faculties for business before they can claim to interfere in its conduct.

Yet it is certain that the higher the condition of the working classes can be raised the more prosperous will be the condition of the nation, and more securely prosperous will be the condition of the employers.

There is a large proportion of the working classes, as of all classes, whose knowledge and capabilities are of a very second-rate kind.

There is also a considerable number of employers whose faculties are of a very second-rate kind; some of them have risen from the condition of workmen without any other instruction than that of working and saving, and getting to know how to employ a small and gradually a larger capital. These are commonly the employers least disposed to pay high wages. They argue that the men are better off on low wages, for that the increase only sends them to the public-house.

This is a one-sided argument of some force. It *is* better that low wages should be paid to drunkards, and that the surplus should go into the pocket of the national saveall, the employer, to increase national capital, than that high wages should be paid for waste and vice.

But the fallacy lies in assuming that their employed must of necessity be drunkards. The employer who can only reason thus may be an employer, but assuredly he is not a *master*. The mere fact that men turn out and strike, is *prima facie* evidence of a want of the master faculty in some of those who have their guidance. It is a proof that they, or those who came before them, have neglected the education and instruction of those in their employ, whom it was their business to teach. In most cases of mutiny the fault lies with the leader who lacks the faculty to govern freemen.

As a national question it is a desirable thing that every human being should be progressive and not stationary; not a mere wages-earner, but an accumulator of capital. All cannot be masters, for their natural aptitudes vary. Few are fitted for masters in the high sense of the word, and many are only fitted to be guided; and if by chance the guide-needer comes to be a guide, it will be the blind leading the blind.

The quality of masterdom or governance of men is a distinct thing from the mere calculating faculty, while the business faculty is much more common. Governance of men in its highest sense means, in addition to great intellect, a considerable power of sympathy to understand men's nature. Business men are apt to consider that cash payment from employer to employed is the whole consideration between them, and thus selfishness is generated on both sides. The sympathetic master will obtain more result from a moderate wage than a mere business employer from a higher wage.

So long as the human workers are merely considered in relation to supply and demand, and left in a condition of ignorance as mere animal machines, so long will they regard the employers as mere taskmasters, and not as natural leaders, and will seek their leaders elsewhere to teach them how best, in commercial language, to "put the screw" upon their employers.

So long as large bodies of working men shall be mere "have nots," earning and consuming a given wage from day to day, and occasionally wanting, so long will they be only loosely held together as a nation. But if any arrangement could be made whereby they could become accumulators of capital on a small scale, they would instantly become preservers of order and opponents of strikes.

This would be their condition, if by any equitable arrangement they could be made sharers in profits.

To propose such a thing is to incur the imputation of that kind of socialism charged, fairly or unfairly, upon the Republicans of a neighbouring nation; but, nevertheless, it is worth the trial.

The chief distinction of the civilised man from the savage is, the power of foregoing a present gratification for the sake of a future greater good.

If, then, it were proposed to the workmen of a mill held by a *master*, to receive in payment, at their option, a minimum wage with a contingent profit, or a maximum wage with no contingent profit, certain of them with calculating aptitudes would take the minimum, the others the maximum. Those taking the minimum would thus be at risk. If at the end of the year the speculation turned out well, a larger number would venture on it in the ensuing year, and these men would become thoughtful and well conducted. They would have a stake in the prosperity of the concern, and be ever on the watch to prevent waste or peculation.

There is nothing new in the proposition—Cornish mines and Nantucket whalers are managed on similar principles; and some of our railways are approximating to them.

It is not difficult to predict that, under such a system, all thoughtful and careful men would become limited partners; the careless would remain at a day wage.

That the men on strike should have a glimmering of the possibility of such a system is no cause for alarm, but, on the contrary, a matter of congratulation, as an indication of permanence,—an assurance that they are not going to America, to the Cape, or to Australia, but desire to become shareholders in the prosperity of the land of their birth; not taking anything away from their employers, but only taking a share of the increment they would help to make.

An objection on the part of the employers would be their indisposition to admit so large a number into a knowledge of their trade. But this is an objection which holds good of all joint-stock companies. And it is very probable that the body of workmen partners would elect one or two of their number to transact the business, as Cornish miners elect their captain. And it must be remembered that the men who would determine to work on such a plan of foregoing a present interest, would instantly assume a new character distinct from the mass of those contented to "live from hand to mouth." The scope would be given to the energetic and intelligent, that would remove all dissatisfaction.

An illustration to a certain extent of the process of workmen taking risks with rising or falling gains, may be found in the China and earthenware manufacture, a trade which is just commencing the transition process from handicraft to machinery, and in which it will depend on the good-sense of the employers whether the transition shall take place peaceably, or with incessant strikes and a constant secession of Mormon potters to Utah. It was formerly the custom to pay separately every one of the various branches of workmen through whose hands the material passed in its progress from clay to china-ware. The slip maker, the thrower, the turner, the dryer, the painter, the glazier, and the various firers and oven men, all affirmed themselves to be perfect workmen: yet, notwithstanding, the turn-out from the oven would obstinately consist of more seconds than firsts, and more thirds than seconds, and more shords than thirds. The employer was the sufferer, without anybody being in fault. This would not do, and the custom was established of paying all the workmen "out of the oven." After that there was no difficulty in finding where the fault lay. Every man and every class watched their neighbours, and a bad workman was soon a marked man without any trouble whatever to the employer. This was practically a sharing in profits. If the work were badly done, the workmen lost their wages and the employer his material. It is true that this arrangement has not altogether prevented strikes, but without it the business would not be carried on at all; and before laying all the blame on the workmen it would be as well to examine the idiosyncracies of all the employers. When the employers shall be first-class philosophers, we

may expect that the workmen will all be obedient disciples.

There is no necessity for these men becoming partners in the plant or capital, but simply in the yearly profits as yearly partners; but, if it were considered desirable, there is no reason why they should not have a small share in a mill as well as in a railway.

The proportional shares that should go to interest, to repairs, to profits, and to wages, it would not be difficult to arrange.

It is clear that saving workmen ought to be enabled to invest their accumulations; and it would be better, in a profitable business, directly, than at mere interest, indirectly.

Supposing that they were to *consume* their yearly profits even in harmless amusements, this would be a great evil. It would be better for the community, better for the workers themselves, that they should receive only the wages needful for food, fuel, clothing, and education, and that their profits should go to their employers' saveall. Directly or indirectly workmen's savings are the creation of capital; and until they are trained to save and invest for themselves, some one will have to take care of their pocket-money, with more or less deduction as perquisites. They will remain as wards of the capitalist's chancery, paying heavy fees to their guardian, but still, better off than if allowed to squander it in waste.

Of those who differ from these views I would ask—Why are there no strikes in the United States?

The only answer is, that the law of partnership facilitates to every skilful man the turning his faculties to the best account. A man can rise to be a master either in partnership or on his own account; and great facilities exist for changing from one employment to another.

In England the law of partnership impedes the establishment of joint stock companies, and trades' unions impede the change of employment, so that if a man happens to be tied to a business he has a distaste for, he must needs keep to it, and be a very unproductive worker. It is a common thing that there is a glut of "hands" in one employment, and a scarcity in another. The principle of supply and demand has thus an artificial hindrance. There is no general superfluity of men, while an artificial superfluity in one branch cuts down the rate of wages in that branch, and engenders misery and strikes.

Handicraft skill in various departments commands high wages; this infallibly induces the use of machine-tools, worked by "labourers." The general tendency is to reduce all skilled work to machines. This reduces the number of men needed for the particular art; but, as new arts are constantly growing up, the total number need not decrease. But calling a man a "labourer," instead of a skilled workman, is no reason why his wages should be lowered. Low-paid labourers are an evil in any country, for they must be poor customers. A well-paid, well-taught, well-clad body of workers, even of comparatively small numbers, is better for a community than an unlimited number of people in lower circumstances of body and mind.

As time rolls on, and as artificial difficulties are removed, the principle of share-holding now applied so largely to public works, such as railways, will be more and more largely applied to every kind of machine-facture, and all our best workmen will grow up into a race of small proprietors—not of land, but of shares in mills and machines. The result will be such an increase of wealth as the world has never yet beheld; such a bonded nation as to be impregnable to external circumstances. A machine factory worked in shares by those interested in all its details, will always eclipse the factory of the mere capitalist worked by hirelings. And the ill-feeling now existing between the capitalists and the intelligent workmen, who feel that their energies under the present system are not half developed, will altogether cease.

Upon the general principles laid down I come to the following conclusions:—

1. That combinations, whether of employers or employed, are only a rude and inartificial method of arriving at the value of labour. That a limited liability in partnerships would almost immediately develope an enormous amount of skilled resources, and that the present capitalists would, after a short time, gladly admit the skilful workmen to such shares in profits as would stimulate them to exertions and results of a most extraordinary kind. Combinations would disappear without any necessity for legislation. Neither the law nor the public have any right to interfere with combinations that are voluntary and peaceable. Any members of the community have the option of submitting to voluntary privation, unless their acts force them on the parish rates. And, nationally, however we may regret the inconvenience, our pride should be gratified at the indomitable perseverance of our working classes in resisting what they, ignorantly or not, consider a wrong. It marks, at least, that they are not serfs, but freemen.

2. Strikes should not, necessarily, induce lock-outs, because two wrongs do not make a right. The mills should be kept open for any sufficient number of men binding themselves to work to cover the expenses of machinery and management. The obvious resource of the employers, if they cannot agree, is the importation of workmen from foreign countries, if—which is dubious—it can be found that a given wage will purchase practically as much labour from a foreigner as from an Englishman. If it will, the result will be good in all ways. It will teach the Englishman his value, and what kind of competition his employers have to contend with. And it will introduce new blood into England—always a gain—when we consider that Englishmen are a compound race of the best blood of every foreign nation that has sought refuge here, in distress or otherwise.

3. There is no equitable mode, save piece-work, to determine the respective values of the various classes of labour. The question of the rate of prices must depend on supply and demand, and the scale of profits. It is usual to take the amount of work an average workman can do in a day as a standard, at a given price per day. To pay by the day needs a large number of foremen and overlookers, who practically are paid out of the workmen's wages, which are thus reduced. If piece-work prices are established when provisions are cheap, they may be quite inefficient when provisions are dear. To regulate this the prices should rise and fall with the standard of wheat But in all cases, new machinery would need a new list of piece-work prices. The system of a minimum wage, with a share of profits, would obviate these difficulties.

Unquestionably it is for the advantage of the employer that the employed should find an advantage in improved machinery. If the farmer is not allowed to kill the game he is apt to break the eggs. The operative, profiting by improved machinery, would aid its improvement all in his power, and would take care that it should not be damaged. Elevating the condition of the workman is a security against pauperism and conspiracy. So soon as the operatives have an interest in improved machinery, the employers with the best mills will obtain the best workmen, and those with inferior mills will get inferior workmen, with lessened profits both to employers and employed. The stimulus to improve machinery will thus be very great, and the faculties of working inventors will be on the constant stretch to put away the old and effete and bring in the new. And, as a consequence, intelligent men will always be found to work perfect machinery at a smaller share of profit than the imperfect.

As regards the actual dispute at issue, the only apparent end of it is the holding out of the money. There is one other measure which most men in business take who love not to waste their property in law. Arbitration! that is, practically electing a dictator for the particular occasion, to get rid of a difficulty which breeds only ill-will and

waste, and which is maintained from an unworthy fear on both sides—fear on the part of the employers that the workmen will tyrannise unless they be reduced to unqualified submission—fear on the part of the workmen, that if they make any concession the employers will tyrannise over them. An arbitration would prove the means of an honourable peace, without detriment to either side, and leaving open the question of future arrangements how to extract the greatest amount of profit from a factory in which both employers and employed might find increased benefit. It were to be wished that some intelligent employer would put this great question fairly to the test, whether an equitable system found to answer in cases of combined risk and intelligence in mines and ships could not answer also in factories wherein the circumstances are more definite.

There will be, no doubt, some very literal people on both sides of the question, who will take it for granted that I seriously expect this trial to be put in universal practice at a given day and specific hour, like Mr. Owen's "sacred month." But I don't even "wish we may get it;" for it would be a scene of unspeakable confusion. It must be quite another race of employers and workmen by whom a rational system of mutual faith and mutual help shall extinguish antagonism. But we live in the condition of progress, and even as the slaves and serfs of former ages have merged into guildsmen and unionists with comparatively little instruction, so will these latter merge into the condition of small capitalists, using their own money in safe ventures of mills and machinery, all tending to the extinction of mere handicraftcy or human machines. The highest rates of wages are those paid to handicraftsmen who, when work is plentiful, dictate their own prices to their employers. The Sheffield trades of files, cutlery, and tools,—those of glass-blowing and china-making are processes of "hands" not heads, and the heads being neglected their owners "put an enemy into their mouths to steal away their brains." They drink to excess, just as did the middle classes and gentry of the last generation, because they have not been taught to think and talk. The same processes that have rescued the middle classes from intoxication will also rescue the misguided amongst the working classes—education—that kind of education that will awaken the mind and faculties to more intellectual and refined enjoyment. All the world knows that in great houses it was at one time the fashion to have the wine-cellar adjoin the dining-room, and that it was a meritorious feat for gentlemen to drink out a hogshead of claret or a butt of sack at a sitting. Precisely in the same fashion a Sheffield handicraftsman in the possession of the accumulated fortune of a fortnight's highly-paid labour, will invite his neighbours to drink out a cask of ale or a tub of Hollands, and I say deliberately that the workman is more excusable than the gentleman. The workman has been taught nothing better, the gentlemen had been through some course of instruction, fitting them for better things.

Years hence, when the workman of the then generation shall be as refined as well as intelligent as the best of the present middle classes, and more so than many of them, we shall wonder at the inertness that so long consigned the strength and staple of our nation to a condition of ignorance, robbing us of half the results that have been shadowed forth by Providence.

Our order of sequence is thus:—

Out of apprentices grow journeymen, out of journeymen foremen, out of foremen employers, out of employers capitalists, out of capitalists members of the legislature, both Commons and Lords. If the course of instruction that the apprentice, journeyman, and foreman go through be only how,—in the London vernacular, "to do the trick," *i.e.* to accumulate money, we cannot expect them to produce either fitting masters or fitting legislators. They will but worship mammon; all in turn striving to keep down those below them, and push down those above them, in a war of classes; each holding by his artifical order while he is in it, and taking no heed of the natural order of Manhood—the highest of all.

With the hope that the offer of the Society may produce some better mode of ending the present dispute than a mere war on pecuniary resources,

I am, Sir, yours faithfully,
W. BRIDGES ADAMS.

1, Adam-street, Adelphi, January 14, 1854.

To Correspondents.

The third and concluding part of Mr. Garvey's paper on "Education as a Science and an Art," will be given next week.

ERRATA.—In the last number, page 132, column 2, letter on Colonial Postage,—line 6, for "recovered," read "revived;" line 16, for "part or parts," read "port or ports;" line 20, for "their reports," read "these respects;" line 21, for "than," read "through," for "or," read "than can;" line 24, for "all at once in some point," read "them at some one or more points;" line 25, for "and," read "or."

MEETINGS FOR THE WEEK.

MON. London Inst., 7.—Mr. J. Phillips, "On the Philosophy of Geology."
Inst. British Architects, 8.—Discussion "On the French Method of Constructing Iron Floors."
Entomological, 8.—Anniversary.
Geographical, 8½.

TUES. Royal Inst., 3.—Prof. Tyndall, "On Heat."
Meteorological, 7.—1. Mr. C. Balara, "On a Certain Law of the Motion of the Winds." 2. Mr. J. Glaisher, "On the Meteorology of the past Quarter in connection with the Fall of Snow at the beginning of this Month."
Civil Engineers, 8.—Mr. J. Leslie. "On Inclined Planes for Canals."
Medical and Chirurgical, 8½.
Zoological, 9.

WED. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Roy. Soc. Literature, 4½.
Society of Arts, 8.—Mr. T. Webster, "On Laws relating to Property in Designs and Inventions; and the Effect of such Laws on the Arts and Manufactures."
Microscopical, 8.
Archæological Assoc., 8½.—Mr. G. V. Irving, "On the Chronology and Geography of the Wars between the Saxons of Northumberland and the Northern Britons, from the Battle of Argoed to that of Raltraez."

THURS. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
London Inst., 7.—Mr. T. A. Malone, "On Photography."
Numismatic, 7.
Antiquaries, 8.
Royal, 8½.

FRI. Philological, 8.
Architectural Assoc., 8.—Class of Design.
Royal Inst., 8½.—Prof. Tyndall, "On the Vibration and Tones produced by the Contact of Bodies having different Temperatures."

SAT. London Inst., 2.—Mr M. T. Masters, "On Elementary Botany."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-Metallic Elements."
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, 13th January,* 1854.]

Dated 21st November, 1853

2701. A. Parfitt, Newbury—Vehicles.

Dated 28th November, 1853.

2771. J. C. Ramsden, Bradford—Looms.

Dated 9th December, 1853.

2358. J. B. E. Ruttre, Paris, and 5, Lawrence Pountney lane—Machines for producing shoddy, &c.

Dated 16th December, 1853.

2934. A. L. Knox, Glasgow—Ornamenting textile fabrics.

Dated 17th December, 1853.

2937. J. S. Bailey, Keighley—Machinery for wool, alpaca, &c., before being spun.
2939. G. Anderson, Rotherhithe—Manufacturing gas.
2941. J. D. M. Stirling, Larches, near Birmingham—Manufacture of iron.
2943. J. James, Cheltenham—Carts for distributing water, &c.

Dated 19th December, 1853.

2947. H. Milward, Redditch—Needles and fish-hooks. (A communication.)
2949. A. E. L. Bellford, 16, Castle street, Holborn—Paddle wheels. (A communication.)
2951. A. E. L. Bellford, 16, Castle street, Holborn—Expressing oil, &c., from fruits, &c. (A communication.)
2953. D. Goldthorp, Cleckheaton—Propeller.

Dated 20th December, 1853.

2955. J. H. Campbell, 1, King's Arms Yard, Coleman street—Cutting corks.
2957. H. E. F. De G. V. Durut, Paris—Bread.
2959. J. Boydell, Gloucester Crescent—Wrought iron frames.
2961. J. Webster, 3, Cornwall road, Stamford street—Oils and varnishes.
2963. J. Burrows, Haigh Foundry, near Wigan—Steam boilers.
2965. R. B. Haygens, Holland, and 89, Chancery lane—Crushing, &c., ores.

Dated 21st December, 1853.

2967. C. J. Farrington, Hampstead—Railway signals, &c.
2969. T. V. Lee, 4, Lockyer terrace, Plymouth, and 5, Bedford row, Dublin—Bricks and tiles.

Dated 22nd December, 1853.

2973. J. Youil, Burton-upon-Trent—Raising liquids, &c.
2975. P. A. Le Comte De Fontaine Moreau, 4, South street, Finsbury, and 39, Rue de l'Echiquier, Paris—Connecting rods. (A communication.)
2977. C. Lewis, Hull—Signal lamp.
2979. T. Berry, Rochdale—J. Mangnall, Heywood, and J. Chadwick, Heywood—Winding wool, &c.
2981. J. Shaw, Hatton Garden—Pianofortes. (A communication.)

Dated 23rd December, 1853.

2983. J. Britten, Birmingham—Girders, &c.
2985. F. Bennoch, Wood street, Cheapside—Coating silk, &c., with gold, &c. (A communication.)

Dated 24th December, 1853.

2987. R. G. Coles, Cheltenham—Locks of fire arms.
2989. G. Goutaret, Paris, and 4, South street, Finsbury—System of propulsion.
2991. H. Hardinge, New York—Liquid quartz or silex.
2993. J. Lewis, Salford—Drilling or boring metals.

Dated 27th December, 1853.

2995. T. W. Makin, Manchester—Finishing woven fabrics.
2997. F. C. Calvert, Manchester—Treatment of Napthas, &c. (A communication.)
2999. S. Sedgwick, and T. Dawson, 186, Piccadilly—Lamps.
3001. T. Molyneaux, Manchester—Winding and doubling silk.

Dated 28th December, 1853.

3003. J. Moffatt, Helton—Communication between guard and driver.
3005. W. U. Coates, Ombersley—Rotary engine.
3007. R. Green, Flint Glass Works, Brettell lane—Insulators.
3009. J. Barnes, Church—Dyeing, &c., cotton, &c.
3013. T. Phillips, jun., Sparkbrook, and S. Phillips, Birmingham—Window-shutters.

Dated 29th December, 1853.

3015. E. Estivant, Givet, France—Copper tubes.
3017. A. F. Rémond, Birmingham—Metallic tubes.
3021. H. C. Vion, Paris, and 16, Castle street, Holborn—Pistons and stuffing boxes.

Dated 30th December, 1853.

3026. H. C. C. de Ruolz, and A. de Fontenay, Paris—Metallic alloy.
3028. W. Mabon, Ardwick Iron Works, Manchester—Rivetting machines.

Dated 31st December, 1853.

3030. J. Milner, Stratford—Connecting the rails of railways.
3034. W. Tuxford, Boston—Thrashing machines.
3036. R. Waygood, Newington Causeway—Portable forges.
3038. J. Slater, Salford—Cocks, taps, or valves.
3040. T. Brown, and P. MacGregor, Manchester—Looms.
3042. B. Hunt, Brighton—Motive power.
3044. F. A. Clerville, Paris, and 4, South street, Finsbury—Fire-arms.

Dated 2nd January, 1854.

2. E. D. Smith, 7 Hertford street, May fair—Communication between passengers, guard, and engineer.
4. J. Gowans, Edinburgh—Heating and ventilating, &c.
6. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury, and 39, Rue de l'Echiquier, Paris—Dyeing wool. (A communication.)

Dated 3rd January, 1854.

8. H. L. Corlett, 106, Summer hill, Dublin—Caoutchouc springs.
10. D. Kennedy, Reading, U.S.—Manufacture of leather.
12. F. A. T. de Beauregard, Paris—Drying cigars, &c.
14. J. Collins, 32, St. Ann street, Liverpool—Vinegar.
16. T. Mann, Horsham—Cinder sifting shovel.
18. J. Dransfield, and W. Robinson, Oldham—Carding engines.

Dated 4th January, 1854.

20. J. Taylor, M. Wrigley, and S. Greaves, Oldham—Carding engines.

Dated 5th January, 1854.

22. E. Schischkar, Halifax, and F. C. Calvert, Manchester—Dyeing.
24. J. H. Johnson, 47, Lincoln's inn fields—Ventilating. (A communication.)
26. L. J. Pomme, Paris—Axles.
28. A. V. Newton, 66, Chancery lane—Crushing, &c., quartz, &c. (A communication.)

WEEKLY LIST OF PATENTS SEALED.

Sealed 13th January, 1854.

1661. Henry Montague Grover, of Hitcham Rectory—A new method of finding and indicating the measurements of the sines and cosines of the arcs of circles or other peripheries.
1663. Thomas Hill Bakewell, of Dishley, Leicestershire—Improvements in ventilating mines.
1667. Arnold Morton, of Cockerill's buildings Bartholomew close—Improvements in the manufacture of paints, pigments, and materials for house painting, paper staining, and decorative purposes generally.
1672. William Henderson, of Bow Common—Improvements in the construction of furnaces for the purpose of obtaining products from ores.
1707. William Boggett, of St. Martin's lane, and William Smith, of Margaret street—Improvements in machines for cleaning and polishing knives.
1758. Thomas Buxton, of Malton—Improved mill for grinding.
1767. Ange Louis du Temple de Beaujeu, of Paris, and of 4 South street, Finsbury—Improvements in rotatory engines.
1982. Eugene de Varroc, of Great Chesterfield street—Certain means of depriving caoutchouc of all unpleasant odour, and of imparting to it various agreeable perfumes.
1995. George Robinson, of Newcastle upon Tyne—The novel application of the slags or refuse matters obtained during the manufacture of metals.
2111. Louis Achille Brocot, of Paris—Improved construction of astronomical calendar.
2355. John Elce, of Manchester—Improvements in machinery for preparing and spinning cotton and other fibrous substances.
2400. Charles Peynaud D'Azene, of 35, Essex street, Strand—Improvements in the method of rendering sea water fit for drinking and all other purposes where fresh water is ordinarily used.
2432. James Garth Marshall and Peter Fairbairn, both of Leeds—Improvements in machinery for combing flax, tow, wool, and other fibrous substances.
2567. Joseph Henry Tuck, of Pall Mall—Improved machinery for obtaining and applying motive power, and for raising and forcing fluids.
2590. Edmund Hugh Graham, of Maine, U.S.—Improvements in firearms.
2608. William Rodger, of 9, Shawfield street, King's road—Improvements in anchors.
2628. Thomas De la Rue, of Bunhill row—Improvement in the manufacture of paper.
2635. Alexander Cuninghame, of Glasgow—Improvements in the manufacture or production of sulphuric acid.
2646. John Hall Brock Thwaites, and William Bird Herapath, both of Bristol—Improvements in the manufacture of quinine and other alkaloids.
2654. John Ronald, of Paisley—Improvements in fixing colours on yarns and cloths.
2662. John Clare, junior, of 21, Exchange buildings, Liverpool—Improvements in the manufacture of bar and sheet metals; in machinery connected therewith; and in the application of such metals to various useful purposes.
2679. William Taylor, of 16, Park street, Gloucester gate—Improvements in anchors.
2680. James Melville, of Roebank Works, Lochwinnoch—Improvements in printing textile fabrics and other surfaces.
2682. Moses Poole, of the Avenue road, Regent's park—Improvements in surface condensers, and in evaporators and heaters for steam engines.
2694. John Gerald Potter and Robert Mills, both of Darwen—Improvements in the manufacture of carpets.
2711. Alfred Bird, of Birmingham—Improvements in apparatus to be employed for the purpose of communicating signals on railway trains and railways; which improvements are also applicable to other similar purposes.
2714. Frederick Levick and Joseph Fieldhouse, both of Cwm Celyn and Blaina Iron Works, Monmouthshire—Improvements in machinery for raising coal and minerals from collieries and mines.
2830. John Mold, of No. 6, Portland terrace, Westmoreland road—Improvement or addition to augment convenience by transformation and facility the different lines required in the erection or manufacturing edifices or structures by apparatus, tools, or instruments suitable for the different capacities of operatives and general surveying.

Journal of the Society of Arts.

FRIDAY, JANUARY 27, 1854.

SWINEY BEQUEST.

In accordance with the will of the late Dr. George Swiney, a joint meeting of the members of the College of Physicians and of the Society of Arts, was held in the rooms of the Society, in the afternoon of Friday, the 20th instant, when it was proposed by Mr. Samuel Redgrave, seconded by Mr. J. P. Brown Westhead, and;

Resolved unanimously—That the bequest of the late Dr. George Swiney, namely, one hundred pounds, contained in a silver goblet of the same value, to the author of the best published work on Jurisprudence, be adjudged to the work entituled "The Commercial Law of the World," by Mr. Leone Levi.

EIGHTH ORDINARY MEETING.

WEDNESDAY, JANUARY 25, 1854.

The Eighth Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 25th instant, Harry Chester, Esq., in the Chair.

The following candidates were balloted for, and duly elected:—

Armstrong, William G., F.R.S.	Hallett, George
Bradbury, Henry Riley	Howard, Philip Henry
Chambers, Th. King, M.D.	Low, Stephen Philpot
Cooke, Wakeman Edward	Matthews, Edward
Coulthard, Joseph	Perry, Sir Erskine
De Vincensi, Joseph	Sandford, Francis R.
	Simon, John, F.R.S.

The following Institutions have been taken into Union since the last announcement:—

332. Chippenham, Literary and Scientific Institution.
333. Llanelly, Mechanics' Institution.
334. London, Beaumont Philosophical Institution.
335. London, Crosby Hall Evening Classes for Young Men.

A model was exhibited of Parratt's Patent Tubular Life Raft. This raft is composed of two rows of vulcanized india-rubber tubes, enclosed in canvass cases and nettings, the two rows meeting at their ends, and forming, when extended, by means of cross spars, a contrivance which is capable of being rowed like a boat. The tubes are proposed to be always kept inflated, so as to be ready at a moment's notice, and to occupy the interior of a long boat, or any ordinary boat carried on a ship's davits.

The Paper read was

ON LAWS RELATING TO PROPERTY IN DESIGNS AND INVENTIONS,

AND THE EFFECT OF SUCH LAWS ON THE ARTS AND MANUFACTURES.

BY THOMAS WEBSTER, M.A., F.R.S, BARRISTER-AT-LAW.

On the present occasion it is my desire to call attention to the effect and practical operation, on the progress of knowledge, and on the advancement of the arts and manufactures, of the recognition and protection of property in intellectual labour, rather than to enter into any elaborate discussion as to the principles on which those laws are founded. It would not be desirable, if practicable, to separate altogether the theoretical from what may be termed the more practical consideration of the subject; the one serves most materially to illustrate the other, as it will be found that what may be termed the natural operations of those laws are of necessity materially modified by defects and difficulties which occur in practice; and the laws relating to property in intellectual labour do not afford any exception to the differences which are invariably found to exist between the theory of every human system of legislation, and the operation of such system in actual practice.

The theory of laws relating to the exclusive enjoyment of intellectual labour, and more especially to that branch of the application of such labour as is exhibited in designs and inventions in the arts and manufactures, has been supposed to present peculiar difficulties, some relating to the origin and foundation of such exclusive rights, others to its mode of enjoyment. It may, however, be doubted, as I have endeavoured to show elsewhere, in my work on the "Policy and Principles of Property in Designs and Inventions," whether the property founded on such rights presents, either in respect of its origin or the principles on which it is founded, any difficulties not common to other species of property. It is perfectly true that this branch of jurisprudence presents a greater diversity of opinion amongst jurists and metaphysicians than most other branches, but these diversities relate rather to the defects of the practical system for the regulation of the creation and mode of enjoyment of such property, than to any difficulties in the subject itself. The general principles upon which this branch of jurisprudence is founded, have been fully considered by me in the work already referred to, and in my works on Designs and Inventions; and it may be more appropriate at a meeting of the Society of Arts to consider the effects and operation of those principles on the progress of arts and manufactures, than to embark in any metaphysical discussion as to their origin or authority. And this would seem specially appropriate to the present occasion, because there have not been wanting occasions when within these walls, or in publications issuing under the authority or sanction of this Society, the existence of such property has been pronounced injurious to those interests which it is the especial object of this Society to promote.

That the Patent Laws, and the kindred laws relating to Designs, must have great influence for good or for evil, no one, I think, can deny. I am not here to contend, nor have I ever contended, that such influence is unmitigated good, still less am I here to represent our existing patent system as all that could be desired, or to deny that the former existing system repealed by the New Patent Law of 1852 was not a disgrace to any civilised community, and sufficient to justify the opinion of those who, judging from the defects and abuses of such a system, were led to deprecate any system of patent laws; but I am now, and have always been, prepared to contend that the recognition and protection to property in intellectual labour, while it is but an act of natural justice to the individual, is the best and wisest policy for the State and for the progress of knowledge in the highest departments of science no less than for the progress of the arts and manufactures of the country.

It will not be sufficient to refer to the almost universal assent of mankind, and practice of civilized nations, respecting such property. The spirit of inquiry now afloat will examine most properly into first principles and their consequences, and there are not wanting those who, while they assert a natural right to property in material things, and to the accumulation of property, and to its distribution after the first occupant or possessor has ceased to have any use for it, deny any analogous natural right to the creator and possessor of the products of intellectual labour.

Exception has been taken to the term property, as

applied to these subjects, on the ground that property can only be said to exist in that of which possession can be had, and that, possession of the idea being gone when a book, or design, or invention has passed out of the possession of its author, he can no longer have any property therein. Such exception is in some respect well founded, but it is rather a question about terms, though an important question in a subject of this kind.

The real subject of property in intellectual labour is the right of multiplying copies; such right, like many others well known to the law, is of an incorporeal nature, and may be regarded as distinct from the material form in or by which the original is presented to the public. The author has possession of, and consequently property in, his manuscript or other results of intellectual labour; the purchaser of a book, or a machine, has a right to use such book or machine at his pleasure, except only to multiply copies thereof for the use of others. This exclusive right of multiplying copies is the subject of property; and inasmuch as the process, so to speak, of such multiplication differs with different subjects, the practical or municipal regulations by which such multiplication is regulated or prohibited may be expected to present corresponding varieties.

The objections to this species of property have usually been confined to certain supposed inconveniences either to the author or the public; but on principle it is difficult to conceive what distinction can be drawn between the right to the benefit of the accumulations of labour, whether physical or mental. Is the more highly-gifted or educated individual, whose labour may, so to speak, be 99-100ths mental, and an 100th physical, to be treated on a different principle to the individual whose labour is 100th mental, and 99-100ths physical. Whenever the question of the propriety of property in intellectual labour is presented in this shape, the opponents shrink from the inevitable consequence of their own principle, seek to shelter themselves behind differences and distinctions in the objects and results of intellectual labour—distinctions and differences, not of kind, but of degree.

Property in intellectual labour is recognised, as copyright in literature, music, and the fine arts; copyright in designs, as applicable to the arts and manufactures and patent-right in inventions. In one respect these various subjects are identical, namely, in the exercise of mind as independent of the material form in which they are embodied.

The creations of the mind, whether embodied in a book, a piece of music, a painting, a design, or an invention, resemble, and are analagous to, each other in this,—that there has been an exercise of intellectual qualities independent of the transference and embodiment, so to speak, of such qualities to and in some material form; such creations of the mind are also analagous to, and resemble each other in the nature of the property which can exist or be acquired therein, but such property is necessarily different in its incidents and mode of enjoyment from property in land, houses, or personal chattels. The idea embodied in a composition, or in an invention, was wholly in the control of the author before such embodiment; the development of the idea, or the disclosure of the secret, was wholly within his power; he had also exclusive possession of property in the composition or invention, that is, in the material form in which the idea is embodied, as well as in the idea before publication thereof; but so soon as the idea becomes communicated to others by publication, exclusive possession is gone; others are able to embody the same idea into material forms, and their exclusion from so doing is matter of positive law and municipal regulation, according to the nature of the subject.

No one can deny the property in the original manuscript, or drawing, or model, so long as it continues in the possession of its author; but publication, which is essential to the public deriving any benefit from the result of intellectual labour, has become an essential condition of such property. To take a simple illustration: one person is in possession of a secret of great commercial value in the arts and manufactures; he has the sole and exclusive privilege, possession, and control of it, and the question is how will you induce him, or make it worth his while to disclose that for the benefit of his fellow-creatures. That is the simple question; its solution is attempted by, and the main object of, all patent laws; and if a system free from the admitted defects of the patent system already in existence can be suggested, by all means let it be substituted.

It has been said that the case of copyright is wholly different; that the author of a book gives something to, and takes nothing from, mankind; that if Milton had not written "Paradise Lost," it is extremely improbable it would never have been written at all; whereas, if Watt had not published his invention, it would most probably have been discovered long ere now by some one else, that a steam engine is worked more economically where the steam is condensed in a separate vessel than in the cylinder. It is perfectly true that an inventor may, in many instances, be said to have forestalled time; but this is strictly true only of those cases in which the wants of society suggest inconveniences to be overcome; those wants, in the progress of society, would probably suggest or lead to the means of supplying them; in all such cases the inventor may be said to have advanced the period of a particular event, to have afforded to the present generation advantages and conveniences which would only have been enjoyed by posterity, and thus to have accelerated the progress of civilization, a result I should conceive entitling him to be rewarded by his contemporaries.

It is impossible to compare the probabilities or improbabilities of the production of a particular work, or the making of a particular invention at another time than actually took place; and I am unable to understand why minds of suitable inclinations and tendencies should be less likely to select the subject adopted by Milton than the subject adopted by Watt, for the exercise of their talents. Such speculations, however, are of little avail, and no one can deny that in either case there was the exercise of mind quite independant of the material form in which the ideas, the result of such exercise, were embodied.

The assumption that books add to the intellectual resources of the world, capable of being used the next day, but that an invention, the subject of a patent, prevents the manufacturer from using not only it but anything like it, is fallacious. The purchaser of a book or a machine has an exclusive right to use the same as he pleases, but is not at liberty to make a copy thereof, or a similar machine, and to sell the same for his own profit. The making of another machine, or of another copy of the book, without the license or consent of the author or inventor, are analogous; but it is from that alone which the public are excluded, and not from the legitimate use either of the work or of the machine, when procured by lawful means.

A book, in addition to affording instruction and amusement on perusal, may afford the means of producing an article of manufacture useful to the public, or of an instrument like the kaleidoscope of Sir David Brewster, calculated to contribute to the amusement of thousands, of which copies might be multiplied *ad infinitum* on an inspection of the instrument, without the purchase of a single copy of his work. Can any reason be assigned why the author should not be allowed that additional reward for the additional or extra value of his work, as affording the means of constructing such an instrument. Works of fiction, and many celebrated works on science and literature, relate to subjects not calculated to improve the arts and manufactures of the country. The author of a novel has copyright in his book, and can prohibit any one multiplying copies thereof without his consent, though he cannot

prevent any one reading from such copy to an audience for profit.

The author of a dramatic piece, or of a musical composition, has copyright therein, and the first representation or performance is equivalent to the first publication of a book, and he can prohibit any other person from representing or performing the same without his consent during such copyright; and the assignment of such copyright, that is to say, of the right to multiply copies thereof, does not convey to the assignee the right to represent or perform such dramatic piece or musical composition.(a) The author of a song or waltz has property therein, and any person who uses a pirated copy thereof to play or sing from, infringes the copyright by such performance.(b)

Upon what principle can it be contended that the author, or assignee of the author, of "Tom Jones," or "Cherry Ripe," or the "Lancer quadrilles," or the last most fashionable waltz, is to have property and protection in the fruit of his intellectual labour, even to the extent of preventing other persons using them in public for performance and representation, and that the author of a design, or of an invention in the arts and manufactures, whereby the taste, comfort, and condition of the mass may be improved, shall have no property in, or protection to, the result of his intellectual labour. Let it be carefully borne in mind that what is prohibited is the same in all cases, namely, such a practice as may detract from the value of that labour to the author. It is in no case necessary that the author should so employ his exclusive privileges as to derive profit by the result of his intellectual labour. It is sufficient that it may be turned to such profitable account, and he has the right to the benefit thereof, and to exclude others from such benefit for a limited time. It is a mistake to suppose that any one of the public is deprived of what they had before; the exclusive right is given as the consideration for the publication of something which they had not before; if they had it before the consideration fails, and the exclusive right is gone; there is no valid or subsisting copyright or patent right, but if there be a subsisting exclusive right, the public must wait for the expiration of the limited term, and continue to use that which they had before, or which the proprietor supplies them with. The notion that an invention any more than a book stands in the way of any but pirates, is a pure mistake; cases may occur, by reason of the mal-administration of the system, having the semblance of such obstruction, but no distinction can be drawn between the author who will not reprint or permit another to reprint his work, or represent or perform, or permit others to represent or perform his composition, and the inventor who will neither practice or permit others to practice his invention. This is a case in which the law may well provide some remedy by way of compulsory purchase, but as this has been fully considered in my recent publication already referred to, I shall not further dwell upon it, except as pointing out a close and consistent analogy of possible inconvenience in both subjects.

The argument from the apparent trifling nature of the inventions is equally fallacious. That from which the public are prohibited must be new, and if it differs insensibly from what existed before, no person will adopt it; but I am at a loss to understand why the inventor of a pen or a pencil, more convenient in use for some purposes than any existing pen or pencil, should not be entitled to a right equally with the author of a copybook for writing, or the compiler and arranger in a new form of a table of figures, or a railway time-table.

Utility, as evidenced by public opinion in adopting the article, is the only true test; if the subject of the exclusive privileges be new, and violate no condition prescribed by the law of the land, as founded on public policy no possible objection can exist to such property or exclusive privileges.

The following opinion by an eminent philosopher, Sir David Brewster, is deserving attentive consideration in reference to some of the objections above adverted to:—

"Scientific men have very often, at the same time perfectly independently of each other, arrived at the same stage of progress which has arisen from previous steps, which have been published; but if a man arrives at one of those steps, and does not think that that step is of any value, and therefore does not claim the idea to himself—and if another man afterwards has arrived at the same idea, and makes use of that idea for the benefit of the public, I hold that the right of the first man, whatever it may have been, is extinguished, and that he is not entitled under these circumstances to come forward and oppose the claim of another. There are many instances of things being kept secret and not published. In the case of the achromatic telescope, it was invented by a country gentleman of the name of Hall, who did not choose to take out a patent, but put the instrument into his drawer. Mr. Dollond got a patent for it afterwards. This instrument was found after the death of Mr. Hall to be the real achromatic telescope. It was decided that Mr. Dollond's patent was not vitiated by the previous discovery of Mr. Hall, who had not made it public. Mr. Hall was a man in a good position in society, and I suppose a man of some wealth, and therefore, I presume, it could not be the expense of the patent which deterred him. Had he been a poor man, I should have inferred that it was the expense of the patent, and the risk of not being able to secure his property in the invention, which deterred him."

It would be easy to multiply opinions to the same effect, but the above will be sufficient for the present occasion, and others may be found in the work before alluded to.

The objects of the patent laws are threefold—

1. The communication of the secret and its preservation for the public.
2. The extension of the arts and manufactures and trade of the country.
3. Reward to the author and publisher of such secret, or introducer of such new trade and manufacture.

It may be conceded to those opponents under the influence of philanthropic views, as to the small amount of pecuniary benefit to inventors as a body, that very few inventors receive any adequate, if any remuneration, for their invention, but the public are the gainers thereby, and the patent laws must be tried by public policy and their benefit to the community at large, rather than remuneration to particular individuals, however much such remuneration may be conformable to feelings of justice. But although in the majority of cases the patentee may receive but little benefit from his invention, there are many gratifying exceptions to this, and numerous instances can without difficulty be named, in which a meritorious invention has been the foundation of the fortune of a working man, and of greatly increased wealth to a capitalist.

Much of the disappointment experienced by patentees arises from their own ignorance, and would be obviated by a proper system of preliminary examination. The ignorant man and mere schemer require protection against their own ignorance and schemes, and it is the duty of the State to afford such protection, and to encourage, without check, delusive hopes of gain. The experience of the working of the Protection of Inventions Act in 1851, whereby provisional protection was conferred on exhibitors at the Great Exhibition, without prejudice to after-acquired patents, enables me to speak with the greatest confidence on this point. There was no power to refuse a certificate, the condition as to the lodging of an adequate description being complied with. Application for certificates under that Act was made in 691 and granted in 615 cases, the majority of the 76 applicants

(a) See 5 & 6 Vict., c. 45, s. 22.
(b) See Russell v. Smith.

to whom certificates were not granted, being satisfied with a hint from myself, or the others associated with me, "that they had better take no further trouble about the matter." Upon this point of preliminary examination great misconception and prejudice exists. In America, Prussia, and some other countries, too much is attempted by the examiners, and too little is left to the applicant. It would not be expedient that an applicant who persisted in his application after due warning, which might be used as a record against him, should be ultimately refused a patent; because many instances might be cited in which the speculations of ingenious men, condemned by persons of great repute, but carried forward under the stimulus of the hope of reward by the enterprize of a patentee or those associated with him, have either been completely successful, or been the pioneers to great success.

So far as the individual inventor is concerned, the patent laws act as a powerful stimulus on his inventive faculties. The hope of gain and reward is predominant; it is a forcing process, to adopt the language of several witnesses of great experience before the Select Committee of the House of Lords, without which numerous inventions would never have been made, or, if made, would never have been introduced into general use for want of that education and continued sustenance which many inventions must receive at the hands of its author and patron. The invention has to be fitted for the public, and the public have to be prepared to receive it, and if either of these conditions be wanting, the invention will fall still-born.

But a class of persons exist who, admitting the justice and policy of recognising property in the production of the mind, contend that, in the present advanced state of the arts and manufactures, such encouragement is unnecessary. I have endeavoured to show elsewhere (See "On Property in Designs and Inventions," already referred to,) that the accumulation of capital and division of labour render such rights equally essential now as formerly, and that, under the present condition of manufacturing industry, protection is in some cases even more essential than formerly, and I cannot but regard the evidence of Messrs. M. D. Hill, A. V. Newton, and Mr. Prosser before the Select Committee of the House of Lords, as to the necessity of such protection in the case of inported inventions in profitable exercise in a foreign country, as entitled to the greatest consideration. (See "Property in Designs and Inventions," pp. 29-34.)

Further, such an opinion appears to me to assume that progress and improvement is not needed now as much as ever, and to overlook the fact that the arts and manufactures must either progress or retrograde both absolutely and relatively; and I contend that our manufacturing superiority can only be maintained by continual progress, and that such progress can only be ensured by giving property in the inventions which are to contribute thereto.

An impression exists in the minds of some persons that, as regards many of our machines, the progress is so far advanced, or that the further improvement is so simple and obvious, that any special property therein will only produce embarassment without corresponding advantage to the public. Such an opinion appears to me fallacious, and contrary to all experience.

Each existing machine and process may be regarded as the accumulated result of the labour of many minds exerted through many years; the improving and simplifying of such a machine is but a continuance of that labour. To disregard such preceding labour is great presumption; to commence "self-taught" from the beginning, is pure waste of intellect, which usually brings its own punishment in the loss of time and imperfection of the result.

Upon this subject, I would refer to the observations of Professor Willis in the lecture delivered at this place on the 25th of January, 1852.(a) "To perfect and reduce to practice the idea of a new machine is no light effort of the intellect, and in proportion to the education of the inventor, so will his steps be rendered surer, more direct, and more rapid. As far as the relative motions of the parts of his machine are concerned his natural faculties may carry him, and probably suggest a variety of constructive methods and cunning devices by which these may be effected; but, in the next place, it becomes necessary to select from these the most appropiate to sustain the forces and resistances,—to estimate the strength to be given to the different parts, their proper qualities of weight, of lightness and stiffness, the amount of friction and a variety of other complex conditions, which can only be determined by statical or dynamical knowledge, but which are necessary to ensure the durability, easy and economical working, and practical value of the contrivance. In the absence of the proper technical knowledge of theoretical mechanics, the proposed machine, if it possess any value, will only arrive at its perfect and permanent form through a series of abortive attempts, which, by a succession of failures and repairs, may perhaps lead to the removal of the weak points of the contrivance. Those parts which by chance were made unnecessarily strong and heavy, will probably retain their original errors. The representations of machines and engines in the collections published in the sixteenth and seventeenth centuries furnish abundant illustration of these remarks. In all that belongs to the mere motion of these contrivances, the greatest possible ingenuity and fertility of invention is displayed. But in all that concerns construction, framing, and adaptation of form and dimensions to resistances, strains, and the nature of the work, a total absence of principle and experience is manifested; so that it is apparent that these machines would act very well in the form of models, but that, if actually set to work, the most of them would knock themselves to pieces in a very short time."

The same author, after reviewing some of the earlier mechanical inventions, says (b):—"In reviewing the comparatively slow progress of machine-tool making, it will appear that in this, as in other branches, steps in invention that, when once made, appear exceedingly simple and obvious, are often the most difficult to take. The chance that such steps will be made is increased by bringing to bear upon them the greatest number of heads; for the peculiar faculties or acquirements of one man or set of men may serve to carry on an invention to a certain point at which it is prepared for and requires those of another set of men who may carry it further. In the old time, the exceeding secresy and jealous care with which every new contrivance was guarded and watched, retarded the advance of machinery to an extent that we can hardly believe. Each man was working in ignorance of his neighbours' improvements, and every art was indeed a mystery. And not only did these difficulties obstruct the progress of machinery, but the enormous expense of constructing new machines. We know that the art of construction has undergone a complete revolution since the block machinery was made, but we can scarcely estimate the prodigious amount of labour and thought that was required to give existence to that machinery, which, indeed, could never have been effected without the resources of the nation in the then imperfect state of the art. To these retarding causes must be added the jealousies of workmen and their dislike of new methods."

Each machine so improved, is, in fact, a new machine, for every machine must be regarded only as the special combination of certain known elements, and in this respect it differs from another large class of inventions in which some new substance, as the welding cast

(a) Lectures on the Results of the Great Exhibition, delivered before the Society of Arts, page 138.

(b) Lectures on the Results of the Great Exhibition delivered before the Society of Arts, pp. 146-7.

steel from common British iron, or the vulcanised rubber, which are known only by their properties, is produced.

The benefits conferred upon the arts by inventions in mechanical science have been much dwelt upon, but those derived from chemical science are still more striking. The various applications of this science have been classified by Dr. Lyon Playfair, in his lecture in this place, Jan. 7, 1852, under the following heads:—

1. Chemical appliances, which have added to human power, either by furnishing substitutes for mechanical contrivances, or by affording tools and methods of arriving at results formerly impossible.

2. Methods of producing economy of time, generally resulting from a constant tendency to simplification.

3. Methods of utilizing products apparently worthless, or of endowing bodies with properties which render them of increased value to industry.

The replacing our expensive mechanical by a cheap chemical process, the rendering objects of apparently little value useful and productive, must ever hold a paramount place in the department of industry having for its object the production of a cheaper or a better *article* for the public.

In chemical as in mechanical inventions the progress of discovery is in the direction of simplification in the economy of labour, and of materials which constitute the husbanding and accumulation of wealth.

"Not a year passes without the most mature processes of manufacture being further simplified and economized. It is with industry as with nature; many of the lower animals have a repetition of organs, destined for the performance of similar functions exercised by single organs in the higher animals. Various stomachs and several eyes in the lower creatures are not more effective than one stomach and two eyes in man. The law of repetition of organs is like the complex processes of manufactures, represented by fewer but more perfect methods as civilization ascends. (Argus, with his hundred eyes, was not nearly such a practical man as a Cyclops with one eye; the hundred eyes of Argus were found napping when work had to be performed, but with the one eye of the Cyclops the trident was forged, which assured to Neptune the empire of the sea.) The industrial position of England has been gained by her perception of this truth, and by her constant endeavours to replace complex processes of manufacture by means more simple and perfect." (a)

It has been truly observed that Art is the mother of, or has generally preceded, science. "Men," says Professor Whewell, in his Inaugural Lecture in this place, 26th November, 1851, (b) "men have executed great and curious, and beautiful works before they had a scientific insight into the principles on which the success of their labours was founded. There were good artificers in brass and iron before the principles of the chemistry of metals were known; there was wine among men before there was a philosophy of vinous fermentation; there were mighty masses raised into the air, cyclopean walls and cromlechs, obelisks and pyramids—probably gigantic Doric pillars and entablatures,—before there was a theory of the mechanical powers. The earlier generations did; the later explained that it had been possible to do. Art was the mother of Science: the vigorous and comely mother of a daughter of far loftier and serener beauty. And as it had been in the period of scientific activity in the ancient world, so was it again in the modern period in which Science began her later growth. The middle ages produced or improved a vast body of arts. Parchment and paper, printing and engraving, glass and steel, compass and gunpowder, clocks and watches, microscopes and telescopes, not to speak of the marvels of architecture, sculpture, and painting, all had their origin and progress while the sciences of recent times were in their cradle or were unborn."

Some of these inventions of the middle ages have been referred to in support of the opinion that privileges in the nature of patent rights are wholly unnecessary. But not to dwell on the fact that several of them were the subject of patents, and of the slow progress of invention in those times, and the almost total absence of information on any subject, it must be borne in mind that this, as has been remarked by the author last quoted, was the age of natural causes, and that until the accumulation of the productions of the middle ages, there was no starting-point; but, this accumulation having taken place, improvement has been working onwards with ever-increasing vigour, and in an expanding sphere.

The stimulus of the patent system in encouraging useful arts and the introduction of new trades in the realm, was felt at a very early period in this country; and although one of the earliest grants on record by Edward III. for the philosopher's stone has been designated by the opponents of all privileges of patents as illustrative of the whole system, it must not be forgotten how much modern chemistry owes to the dreams of the alchemist after the philosopher's stone, or that the quadrature of the circle has given rise to many most elegant mathematical theorems, or that the attempts at perpetual motion has given to the world many new and useful combinations of machinery, or new machines for the modification of force and motion.

In some cases the proposition has been reversed, and Art is the daughter of Science, that is to say, invention has been founded on the direct application of laws of nature anticipating and producing the result. The chemical manufactories of modern times furnish a most remarkable instance of processes derived from the chemical theories of the last and present century, and owing their existence entirely to a profound and scientific knowledge of chemistry. But even still there are many instances in which art is in advance of science, and we are not as yet informed by science why the Swedish steel is still unmatched, or to what peculiar combination the Toledo blade owes its fine temper, or what is the real operation of the agents in producing the vulcanised India rubber, or how to reproduce synthetically many substances the elements of which, as shown by analysis, are ready to our hands

The operation of strikes has had considerable influence on the progress of invention, but it may be doubted whether even this strong stimulus would have been sufficient without the protection of a patent. The self-acting mule, the wool-combing machinery, and the rivetting machine, are due entirely to these causes. The masters, when embarrassed by the combination of the head spinners, solicited Mr. Roberts to render the mule self-acting. He spent many years in perfecting this; but it must be obvious to any one who reads his own account of this invention, that he could never have been rewarded for this without the protection of letters patent. (a)

It lies upon the impugners of a system which has received the almost universal approval of all civilized nations, to show some better system of rewarding the inventor and encouraging invention. I am not now contending for any particular system, but for the principle and policy of such recognition and protection of the labour of inventive genius, so as to reward the inventor by the creation and maintenance of property therein.

To the instances above enumerated many others might be added. Each case heard before the Judicial Committee of the Privy Council, on an application for an extension of letters patent, is but a repetition of, and illustration of, the same general history; the difficulty of overcoming the prejudices of the public, and the opposition of the capitalist, who is, in the majority of cases,

(a) Lectures on the Results of the Great Exhibition, delivered before the Society of Arts, page 76.

(b) Lectures on the Results of the Great Exhibition, delivered before the Society of Arts, page 3.

(a) See evidence of Mr. Roberts, "Principles and Policy of Patents," p. 39.

directly interested in the maintenance of things as they are,—a species of conservative policy into which the most liberal are apt readily to fall.

The state of things at the commencement of the eighteenth century is thus described by Mr. Bazley in his lecture from this place :—a()

"An intelligent and untiring Anglo-Saxon race had attained a position without parallel in the history of nations. Science had begun to aid mechanical skill; labourers, who had partaken of the fruit of their own toil, were anxiously waiting to see extended for themselves, their families, and friends, those agents of production which, though only in the initiative, were still in very successful, profitable, and improving application; and merchants and capitalists found, in these new circumstances, that energy and enterprise, if generously directed in the channel of the rising tide of trade, might conduce not only to their own but to their country's weal."

May not that language be accurately applied to the present times? Has the progress made during the eighteenth century so changed the nature of things? May we not, in the nineteenth century, reasonably expect similar results to follow from similar causes?

The progress made during the last century is so great, and the capital embarked in existing machinery is so large in amount, that some persons would be disposed to ay, invent and improve no more.

But no stationary condition can exist; the law of our nature is progression or retrogression; the Great Exhibition has shown to the minds most competent to judge of the state of the manufacturing arts in foreign countries, that though the race is now free to all, the legacy of a keen competition is left to this country.

The unanimous testimony of those best competent to judge is in favour of industrial education, and in this I most cordially concur, but when you have educated your pupils in the schools of design, and of the various departments of industrial arts, the best security for their progress is the creation and maintenance of a class of independent persons, having a property in the productions which their education fits them to produce.

In an advanced state of the arts and manufactures great and extensive changes can rarely occur, but the steady and progressive improvements must be looked for at the hands of the working man, of those who are engaged in the daily routine of the arts. It is to the skilled artizan that we must look for those improvements which will enable our manufacturers to produce both in quality and quantity at prices which will defy competition with the rest of the world.

The testimony of the most intelligent and best judges show that a very large proportion of inventions proceed from operatives. A workman has been the greatest improver of the loom in modern times, and I believe that under the beneficial provisions of the new Patent Law, properly administered, the operatives and artizans of this country will be found in the next century to occupy the position of the Watts and the Arkwrights of the last century. Looking to what has been already done by operatives and to the greatly improved means of education accessible to all, I believe the future progress of the manufacturing industry of this country to be mainly in the hands of those whose daily labour shall have made them conversant with the necessities and requirements of the machinery and processes upon which they are engaged.

We shall not, as in the case of the block machinery already referred to (by Professor Willis), require the resources of a nation to develope useful inventions;—afford suitable protection to inventors, and to property in inventions; alter the law of partnership, so as to afford free scope for the application of private capital; and I see no reason for doubting that the progress of the succeeding will be as great, if not greater, than the progress of the preceding century.

It has been hitherto a reproach to this country that the working man was excluded from the acquisition of property in the subjects in which he was by education and occupation best adapted to make improvements; now, however, the race is open to all, and the course of progress is no longer monopolized by those alone who have capital at their use and to whom success or failure would be comparatively matter of indifference.

In some cases invention may have progressed nearly to its utmost limit. In the combination of the simple elements of machinery, and in the manufacture of linen, cotton, woollen, and mixed fabrics little further remains to be done beyond reducing the cost according to the facilities for obtaining the raw material; but in such cases the art of design may step in. In the construction of machinery the framing and other parts may be formed and combined upon a system subservient to some one design, and that design may not only be in itself ornamental, but it may be formed in strict accordance with the true principles of strength and proportion of parts in which, according to the testimony of Professor Willis, the early machines are so deficient. For instance, the framing of machinery may be constructed according to what has been described as the elliptical design; thus the arts of construction and design become combined, and the same machine may be the subject of property by letters patent as regards the design according to which the parts are arranged. Now for such design the law has hitherto provided most inadequate protection, indeed, it may be doubted whether any protection at all exists; but it will be obvious that such a design may be the result of great thought, labour, and ingenuity, and, from the relative proportion of parts, may be better adapted to the purpose than any other. Such a design may be the result of the experience of many years, yet it may be appropriated by any person engaged in a similar department of industry who may be the first to see it.

The subject of designs for the framing of machinery is one which has received much attention from some machine makers, and I would mention, as an instance well deserving of commendation, the framing of the elaborate machinery for printing carpets erected under the superintendance of, I believe, Mr. Burch and Mr. Fothergill, at Crag, near Macclesfield. This may serve to show the close connection between the two subjects of designs and invention under circumstances which have hitherto received but little attention.

But other instances, equally illustrative of the connection may be selected, as for instance, the damask manufacture of our sister country. In the mechanical structure of the loom for plain or figured weaving, little, probably, remains to be done; each new pattern requires the working of the known elements according to some particular order or law which constitutes the new design. Such a figured fabric, that is, a fabric made by working the elements of the loom in the particular order specified by the design, is essentially a new manufacture; and yet, for such a design, protection can only be obtained for the short period of one year, a term wholly inadequate to repay the expense of its production. Now, looking to this fact, that to design alone we must look to the further progress of that and similar manufactures, I am at a loss to understand why the term of protection should not be as long as the term for any improvement in the manufacture itself, if the subject of a patent.

The design, however beautiful, is of no value unless embodied; the copyright is for the application of such design to the manufacture; the fabric representing that design may not legitimately be regarded as a new manufacture.

Again, take the case of calico printing. The preparation of the design on paper requires much skill and talent; its transference to the fabric for which it is designed may require great skill and capital; the stock of engraved

(a) Lectures "On the Results of the Great Exhibition," delivered before the Society of Arts, pp. 349-5 .

rollers of Messrs. Hoyle. of Manchester, would represent no mean amount of capital in time, labour, and money expended on their preparation; is the term of one, two, or three years any adequate protection for the expenditure which may have taken place in the production of new patterns or fabrics. What more legitimate plan can be suggested for encouraging design than to give property therein for a period adequate to repay the cost of production.

The Copyright of Designs Act assigns different terms of copyright, but upon what grounds I am at a loss to understand; the principle of property, however, having been admitted, and protection established by the Legislature, the length of time might safely be extended, subject, however, to an annual or to periodical payments in an increasing ratio during its subsistence, and analagous in some respects to the periodical payments under the new patent law, though the difference of the subjects may very properly admit of a corresponding difference in this respect.

It has been objected that many designs are of so fugitive an interest that 12 months' property is all that is required; in such cases the author or proprietor would not make a second payment, and the design would become public property; but the proprietor is the best judge of this, and if he be willing to make a continually increasing payment, he is paying a tax to the country during the subsistence of the limited monopoly to which, as it appears to me, no possible objection can be taken.

The progress of the arts and manufactures, and the history of protection to property therein, presents several epochs and leading divisions. During the first, the manufactures themselves; machines for facilitating the working of the raw material, and processes and combinations of matter for the production of the required article were alone the subject of property and protection; recently, however, and in a more advanced stage, when the production of the manufactured articles had advanced to a certain stage of perfection, attention became directed to the encouragement of design, whereby the article so produced might present forms and appearances more agreeable to the eye, and as a further step protection was extended to such shapes and configuration as might be subservient to utility, as distinguished from such shade and configuration as was ornamental.

These designs became, as it were, superadded to manufactures, and was in no respect of the essence of the manufacture in which it was applied or embodied.

The distinction between the subject of the Utility Designs Act, as it has been termed, in contradistinction to the Ornamental Designs Act, and the subject matter of letters patent, is but little understood; and although a class of cases exist which are clearly within the provisions of that act, the result of experience shows that it was used as a means of escape from the existing patent system, and since the introduction of the new patent system the registrations have become in number altogether insignificant. The litigation under that act was of the most unsatisfactory description, almost every conviction appealed against having been quashed on the ground of the subject registered not being within the Designs Act.

The legislation on the subject of designs requires entire revision, both as regards the subject, the term, the payment, and the remedies, and it can hardly be doubted but that an assimilation to the practice of the New Patent Law would be a great boon to artists and other ingenious men engaged in what has recently, and with much propriety, been designated as art-manufacture.

It can hardly be doubted by any person acquainted with the history of the arts and manufactures of this country, that property in designs and inventions is calculated to act as a great stimulus to foster and encourage the application of talent, to tend to the establishment of new trades, to obtain a disclosure of secrets, and to make the educated artizan of this country—to some small extent—independent of the capitalist.

The encouragement of open as against secret manufacture, with all the evil consequences of workmen under heavy bonds for secrecy, of attempts to bribe and ascertain secret processes, is a leading feature of the policy of patent laws; but the laws are not as adequate for this purpose as they might be rendered, and one of the next steps in the reform of the law, as distinguished from the practice of patents, will be affording additional encouragement to the disclosure of secret processes, of which the manufactured result affords no information, and to the discouragement of such secret manufacture.

If an operative is to be compelled to rely on the liberality of a master, and to be denied the power of obtaining property for himself in any improvement, resource will inevitably be had to secret manufacture, and to every attempt to deceive those who might disclose the secret; or if the aiders or abetters of such secret practices can be allowed thereby to impeach the validity of the after-acquired patent of a *bona fide* and independent inventor, who has communicated his discoveries to the world on the faith of such protection, an additional encouragement is afforded to such secret practices.

But the education and progress of the working classes, and the successful carrying out of many of the schemes in which the Society have taken much interest, appear to me deeply involved in the same question.

It has been remarked that one effect of the old system of patent law was to foster a body of speculators, most of whom were very ignorant of the subjects to which their supposed invention belonged; and it is believed that this unquestionable mischief might be obviated, or in a great measure diminished, by the new system of patents. Further, in proportion as you educate the workman, you raise him above the prejudices which exhibit themselves in their opposition to improved methods and machinery; and if he can acquire property in the result of his improved education, you create a recognised class of inventors, having interests opposed to the views of the short-sighted capitalist, who would obstruct improvement by reason of the relative disadvantage in which he is placed, if compelled to work his existing against improved machinery, or to replace existing by new apparatus.

The connection of property in designs and inventions with the improved education of the artisan and operative, appears to me most intimate, and I would commend it to the serious consideration of all who are interested in the efforts which are now being made for affording such instruction.

The capitalist, while enjoying the benefits of his capital, the accumulation of labour, skilled and unskilled, is not in general insensible to the claims and necessities of those whose capital mainly consists in their skill and education: and the latter class, if properly instructed, will be aware how their capital may be legitimately employed in connection with the accumulated capital of others, and thus each may be brought to feel that they neither do or ought to live for the benefit of themselves alone, but for the mutual benefit of those with whom they may be inseparably connected.

DISCUSSION.

The CHAIRMAN said the subject of the Patent Laws was of great importance to a Society having for its object the promotion of improvements in the arts and manufactures, and no doubt, therefore, many gentlemen would be desirous of expressing their opinions upon the paper read by Mr. Webster. He believed it was the custom of the Speaker of the House of Commons, to catch alternately the eye of the members on different sides of the house, and as he was desirous of hearing both sides of the question, though, he could hardly say that he had caught the eye of Mr. Denison, yet, as he knew that gentleman took a great interest in the question, he would call upon him to favour the meeting with his views upon it.

Mr. E. B. Denison, having communicated his opinions on the patent laws, through the Journal of the Society, would have preferred to have heard some one else speak on the subject, as it was always unpleasant to be singing the same song; he was sure the Chairman had not caught his eye, as he had averted his head to prevent his doing so; but, as that gentleman had been pleased to call upon him, he would make a few observations on the subject before them. Mr. Webster had commenced his paper with a disquisition relative to property, which was a favourite topic with the advocates of the patent laws, and in doing so, had become far too metaphysical and philosophical for him (Mr. D.) to follow. On practical subjects, he thought metaphysical arguments completely out of place, and he should, therefore, say as little as possible on the subject of property. Mr. Webster said, that the law recognized various kinds of property, as well as real property. Now, in some parts of the country there was a property called soke mills, the owners of which have the privilege of grinding all the corn produced throughout the soke. Now that was a monopoly which did not meet with much favour in the districts in which it prevailed, and was most fertile in law-suits and injustice, and he hardly thought that even the advocates of the patent laws would wish for its extension. There were other incorporeal rights of property, such as the use of roads, easements, &c., but he supposed that the advocates of property in patents hardly founded their arguments on those rights. What was property? Property in the funds, houses, lands, &c., was acquired by getting hold of that which formerly belonged to some one else. He as an advocate might receive money which he put into his pocket, but that was by way of wages for his labour, and was in the same position as the profit acquired by trade, and which the tradesman was allowed to possess for his trouble in selling his goods. Now property so acquired did not interfere with that of others; but property in patents might, and generally did so. There was another kind of property to which Mr. Webster alluded, called copyright, and which was contended to be analagous to patent right. He admitted that he had long been a stalking horse with himself, but he now saw clearly the difference between copyright and the patent laws. Mr. Webster had alluded to Milton's "Paradise Lost," and said that it was not probable any other person would have written that poem. He did not say that it was probable, but somebody might have taken up the same subject and written upon it; and if anybody believed that somebody else might have written Milton's "Paradise Lost," why let him believe it. There was this difference between copyright and the patent laws,—copyright interfered with nobody, but the patent laws did. Every book that was published assisted those who came after, and if one man wrote a good book upon any subject, it did not prevent another person writing a better or a worse; all that he was prevented doing was, the copying the work of another; whilst the patent laws said, that whilst a patent was in existence no person should make a similar article to that patented. Sir David Brewster stated that all great inventions were arrived at by a number of persons at the same time, the world being ripe for them. Now and then a man might be before the world, but that was an exceptional case, and therefore the law ought not to interfere for his protection. The patent laws gave to mankind a right, which, without them, they would not have. Man had not that right by common law, and therefore he was assisted by positive law as distinguished from natural law; and those who supported it could not make out a proper case in its defence. It was admitted that patentees generally lost money, although there were some great and famous exceptions. Watt made money, but he had it on the authority of Lord Brougham, that he would have made more money without his patents, although they had been extended to him for thirty years by Act of Parliament. Arkwright, Crompton, Hargreaves, and other distinguished inventors, had ruined themselves, and had had to apply to Parliament for money; whilst a man who made a trumpery invention, which came into general use, might make a fortune, although he had not extended the bounds of human knowledge. Who was the inventor of the Electric Telegraph? Why the man who discovered the power and connection of electricity and galvanism—Oersted, but not having practically applied it, he could not claim a patent. Neither Newton, Leibnitz, nor Faraday ever obtained patents for their discoveries [Mr. Prosser—Faraday had a patent for improving gas lights]. He thought that it had been Faraday's brother who was the patentee of that invention; but supposing that it was Faraday himself (which he, Mr. D., did not believe), his name would go down to posterity as having made great discoveries in electrical science, and as being the patentee of what—improvements in gas lights. Where was there another eminent man who had obtained a patent? [Mr. Webster—Sir David Brewster.] Yes, Sir David Brewster, obtained a patent for his kaleidescope, a toy, from which he estimated he might have made £200,000,—rather a stiffish figure for a toy,—had it not been pirated so extensively by men not worth powder and shot. Well, Sir D. Brewster, would go down to posterity as one of the most scientific men of his age, and as the patentee of a toy. Even Mr. Webster admitted that in some cases the law of copyright might be a great evil, though he thought that it had been improved by late statutory alterations. Sir Wm. Cubitt, who had been long connected with patents, having been in the house of Ransome and May, of Ipswich, stated that the patent laws had been productive of great mischief, and that the only difference between himself and others was this, that they all thought that they had a cure for the evil, whilst he did not, and he was opposed to those laws. [A Voice—That is not quite what he says.] Well, if not the exact words, it was something to the same effect. They had heard Mr. Webster quote the opinion of Sir David Brewster, but he was not thoroughly acquainted with patents, and he only gave theoretical or speculative evidence, imagining what might happen—as many other people did—if certain things were to occur. Sir David, with others, had stated that the majority of inventions proceeded from workmen. That was not so. It was like a person seeing a number of others with whom he agreed, and then imagining that he had obtained a fair representation of public opinion. Now, if they looked to the evidence of Mr. Fairbairn, they would find that gentleman stating that the best and largest inventions proceeded from the working-partners of firms—and it was natural that it should be so—although the details on which, perhaps, 800 inventions might be claimed proceeded from the workmen being in fact more like dodges than inventions, though it was very necessary that the workmen should be encouraged in producing them. There was an inquiry before Parliament on this subject in 1829, when the average number of patents was 130 a year, and again in 1851, when they had increased to 500. He had looked through the evidence given before those committees, and he found that in 1829 not a single person had hinted at getting rid of those laws, while in 1851 the independent witnesses were divided in opinion upon the subject. He used the term independent witnesses, without intending to be offensive to any one, but he could not look upon the patent agents, or even on Mr. Webster himself, as totally unbiassed by their position. Sir Wm. Cubitt opposed the patent laws, and so did Mr. Brunel—no mean authority. Colonel Sir William Reid, C.B., who was the chairman of the Executive Committee of the Great Exhibition, and saw the effect of the registration of patents, strongly expressed his opinion against the continuance of the patent laws. The evidence of Mr. Ricardo, the chairman of the Electric Telegraph Company, was most curious, as a specimen of candour and

straightforwardness. Mr. Ricardo told the committee that this company had bought up £200,000 worth of patents, as every invention brought to them by a good man, in the lawyer's sense of the word, they bought up, and when asked if they used these patents, he replied, "Certainly not;" but it was less trouble to buy up a man for £2,000 or £3,000 than to litigate with him; and sometimes, an individual would bring them the model of an invention, and although he might be shown that it had been already patented, he could be scarcely brought to believe that it was not a copy of his own. Mr. Farey, the inventor of machinery for refining sugar, told the committee that the patent laws were no protection, and that the inventor of the idea of refining the sugar *in vacuo* could not make it answer; but a German discovered how, by a slight alteration in the machinery, he might do so and obtain all the advantages—the first inventor getting nothing. The Consul-General for Switzerland, Mr. Prevost, he believed, gave evidence that although there were no patent laws in Switzerland they did not suffer for the want of them, and all the world knew that Switzerland was not behind other countries, either in ingenuity or cheapness. If they read the evidence of other witnesses, such as Mr. Fairbairn, Mr. Rendel, &c., they would find that though they gave evidence in favour of patent laws, their minds were evidently in a transition state, and probably the next time they would be called on to give evidence they might be found on the other side of the question. There were also two other parties who, although they had not been examined, had yet given very strong opinions against the patent laws—opinions which he thought would carry some weight. He alluded to Earl Granville and Mr. Scott Russell. Now the latter gentleman was himself an inventor, and expressed himself decidedly against patents, though he stated that while the law remained as it was he should take advantage of it. It was very easy for Mr. Roberts, of Manchester, to say that he would not have produced his patents but for the protection of the patent laws, but neither Mr. Roberts nor any one else could know what he would himself do under different circumstances. In clock-making, with which he was connected, there were dozens of inventions to effect the same object brought out together, all answering to a certain extent, and all worth using. As an illustration of the disadvantages resulting from the patent laws, he might refer them to the opinion given by that jury of the Great Exhibition of which Sir D. Brewster was chairman, wherein it had been stated that a greater portion of the goods exhibited in their section had been made to avoid patents, and they could not help thinking that the improvements in photography had been merely owing to the original patents having failed, and to Mr. Fox Talbot, on being requested by a committee to give up his patents, because they were an obstacle to improvement, having done so. What had happened even last week in that room? Why, Mr. Judkins, in describing his stitching machine, spoke of the obstacles thrown in his way by another machine, which, having been patented, would not work; and in a number of the *Household Words*, which he had lately purchased, he found that after the expiration of the first patent, the manufacture of concertinas had greatly increased and improved. He might multiply instances, but it was unnecessary to do so. Mr. Webster had referred to combinations of men as necessary to carry out improvements; but, so far from Professor Willis's views telling in favour of the patent laws it told against them. With regard to preliminary inquiries, of which Mr. Webster had spoken, it proved the weakness of the patent people, who, when driven into a corner, said that the whole of their difficulties arose from the bad state of the law. Preliminary inquiries had always failed to satisfy the public. They had been instituted with regard to private bills for railways, &c., and although it employed many gentlemen of his profession, and engineers, it was soon found that all the money had been cast away, and they were abolished. Then, again, there had been the preliminary inquiries of the Board of Trade with respect to railways, but the instant they gave an opinion against one or two large companies, the latter said they should not abide by the opinion, but should go to parliament as though it had not been given. And what had been the result? Why the Great Northern Railway, which had been described as a gigantic humbug, obtained their Bill, and was now considered one of the most useful lines in the country. A good deal had been said about chemical discoveries. Now, these last could not be made by working men, but must be the result of the scientific inquiries, of such men as Faraday and Oersted. Sir John Herschel, in his "Natural Philosophy," stated that any clever man, shut up by himself, could work out all the results of mathematical science, but that he would not be able to discover what sugar would do when thrown into a cup of tea. Chemical discoveries were but the carrying out of the laws of nature; and surely no one would say that those laws should be shut up from the world for 14 years. Therefore the growing importance of chemical discoveries, as compared with those now taking place in mechanics, showed the necessity of doing away with those patent laws. Mr. Roberts, to whom he had before alluded, the inventor of the self-acting mule, stated that he should not have introduced it but for the protection of the patent laws; yet, it was acknowledged that that mule had been invented on the suggestion of some masters, who had applied to him to do so, in consequence of the continuous strikes of their men, they knowing Mr. Roberts to be an ingenious mechanic; but, what would have been the result if the patent laws had not been in existence. Why Mr. Roberts would have refused to undertake the task, unless upon a guarantee, which they would readily have given, whilst Mr. Roberts would have received his reward at once, instead of waiting to receive it under the patent laws. With regard to secret manufactures, this appeared to him to be a standing joke of the patent men. They could not have manufactures in secret; or, if they could do so, he would tell any man that it was better than a patent, because, by secrecy, they would avoid litigation, whilst with the patent laws, they were sure of nothing but litigation.

Mr. Prosser had had a great deal to do with patentees, and was himself among the number, and he supported the patent laws. The gentleman who spoke last appeared not to have read up the literature of patents, and was ignorant of everything connected with it. Notwithstanding what Mr. Denison had said of Faraday, he could assure them that Michael Faraday invented a means of ventilating gas lights, which he gave to his brother Robert, who patented it. He held in his hand a great and important educational work, which had been recently published; and to which he wished to direct the attention of Mr. Denison. Patents had been granted from a very early time in England; and the Commissioners of patents had recently published *in extenso* a list of all the specification of patents from 1617 to 1853, amounting in number to 14,359. Under the new law, which had been only a short time in operation, there had been upwards of 3,000 patents taken out in one year, whereas, previous to the alteration, they only averaged 500 a year. The people were so grossly ignorant that they took out 3000 patents at £10, whereas they only took out 500 when they cost £500. No doubt these people were grossly ignorant, but still the majority of inventors were in favour of patent laws; but they liked the protection of their inventions to be cheaply obtained. He had given his opinion that not one invention in 100 was good for anything; and the ratio he believed was now even higher. At the Crystal Palace they were all taken by suprise by the inventive genius of the Yankees, who exhibited reaping machines, rocking cradles, &c. Now the reaping machine was not

new; he held in his hand a large volume of specifications for such machines, and this Society offered a prize for one 40 years before the Yankee machine appeared, and though it obtained the Council Medal at the Great Exhibition it was afterwards discovered to be an English invention, which had been taken to America, where it was patented, and was afterwards brought back here, as was explained lately by Mr. Bell, the inventor, at a meeting of the Highland Agricultural Society. This Society gave a reward to Sir Joseph Paxton for his sash bars—though he (Mr. Prosser,) had discovered a similar thing was patented in 1798. And in regard to the reaping-machine, one Pliny described a better system than either Mr. Bell's or the Yankees', thirty years before Christ.

The Chairman announced that the further discussion of this subject would be adjourned to Wednesday next, the 1st of February.

EDUCATION AS A SCIENCE AND AN ART.

By M. A. Garvey.

(*Concluded from page* 136.)

Our former papers on this subject were devoted to the investigation of the general properties of mind, and to the elucidation of the principal laws of thought. Our object, it will be remembered, was to ascertain the scope of the mental powers, with a view to the establishment of a standard for their development. That some such standard is necessary as a guide to the complete and efficient training of the faculties is obvious; in the absence of it education must be merely a series of desultory experiments, without any definite end, and therefore without any certain results. It is only by the careful examination of the nature and operations of the mind meanwhile, that the measure of its capacity can be even proximately estimated. An attempt to define the province of reason by indicating the various directions of legitimate inquiry, and classifying all that man may know, would require an acquaintance not only with all existing science, but also with the possible issue of all future discoveries—such knowledge, in short, as can belong to one Being only. We must be content, then, with ascertaining as nearly as we can, the true nature of the understanding, without endeavouring to trace out its objective boundaries; we must strive to make ourselves acquainted with the power of the intellectual instrument, and with the modes of its operation, though it is impossible to foresee all the purposes to which it may be applied.

This is the most valuable of all attainments, for it is the knowledge of ourselves, without which all other acquisitions are but elaborate ignorance. It makes us conscious of our weakness, it is true, but that very consciousness is the secret of all our real strength. If, on the one hand, it reveal to us the fact that there are many purposes to which our powers are unsuited and incompetent, it convinces us on the other that within the proper range of their activity we may confidently rely upon their effectiveness. We are thus warned early against wasting our energies in pursuit of unattainable shadows, and at the same time encouraged to attempt the loftiest objects of which we are capable. The consciousness that we are not fitted to walk upon the surface of the waters, or dart through the air, does not diminish the confidence with which we tread the plain or scale the mountain.

The faculties of the mind may be trained and exercised until they attain their full development, but this, as we have seen (page 114), can be effected by suitable instruction only; that is, by presenting knowledge in such forms and by such methods as accord with the laws of the mental constitution, and are calculated to excite all its powers to activity. The mode of instruction is therefore of far greater importance than the matter, at least in the earlier period of life; for the great object should then be to solicit the energies of the mind; to strengthen, to sharpen, and to harmonise all its faculties, so that they may be prepared for all future emergencies, and fitted to acquire as rapidly and as accurately as possible whatever kind of knowledge may be necessary to meet the exigency of the occasion as it arises.

This brings us to the great practical inquiry with which we set out, namely—What are the most suitable methods of imparting instruction so as to secure the full development of the mind? This question involves the whole art of education. We shall endeavour to answer it by showing how the principles we have deduced from our investigation of the mind should guide us in our efforts for its training. We can add no faculty to the mind, that is certain, neither can we deprive it of any—we must deal with it as we find it. The most perfect education is that which surrounds the opening mind with those influences which are adapted to awaken and cherish its dormant energies, so that by their own inherent vitality they shall unfold themselves to forms of beauty and excellency, and not be rudely torn open by ignorant impatience. This may appear too narrow an estimate of the sphere of education. It is not so. It leaves an almost immeasurable field, upon the cultivation of which the highest genius and skill may be employed with the most precious results. The wonders of cultivation surround us on every side. The wild forest bramble, with its stunted growth and acrid berries, by careful tending becomes a flourishing tree, bearing sweet and nutritious fruit. The plant which, if suffered to languish in coldness and darkness, would have been an etiolated and scentless abortion, by being exposed to the genial influence of warmth and light, effloresces in forms of manifold loveliness, adorned with the richest colours, and breathing a fragrance almost spiritual.

But even these triumphs of culture are insignificant compared with the mighty change it produces in the intellectual and moral condition of man. From the barbarous gloom of ignorance in which he grasped blindly after the gratification of the present moment, forgetful of yesterday and careless of to-morrow, with the faculty of reason prostrated to the level of mere animal instinct, he may, by the judicious application of the proper influences, be elevated into a region of etherial light, which will animate and irradiate his whole nature, and so expand the range of intellectual vision, that he shall be enabled to survey the past, and, with almost prophetic power, to anticipate the future.

The mind, at every instant of its wakeful activity, is engaged in one or more of three ways. It is either acquiring knowledge, or elaborating its acquisitions, or applying to practical purposes the knowledge it has elaborated. All these operations may be, and indeed generally are, going on simultaneously, but it will be found that some one of them always predominates, according to circumstances, calling into action the appropriate powers of the mind, and giving it its principal occupation for the time, the other operations being still carried on, though subordinately and collaterally.

This will appear plainly if we attend to the movements of our own minds at different seasons. When engaged in the study of a new subject of practical importance, for example, our chief object at first is the acquisition of knowledge, but even whilst acquring it we compare, analyse, and arrange its elements, and think of their future utility. When our knowledge of the subject has reached a certain degree of completeness, though much may yet remain to be learned, the process of elaborating and systematizing becomes predominant over that of acquisition without arresting it, and the practical uses of the study rise more distinctly to view. Finally, when the elements of knowledge have been elaborated into some settled principles, the activity of the mind becomes chiefly engaged in the application of these principles, without at the same time ceasing to accumulate the elements of knowledge, or to carry on their arrangement

It is in surveying the whole life of man, however, considered as the subject of an educational process, which

begins with the earliest dawn of the intellect and continues till the latest moment of consciousness, that we are enabled most clearly to distinguish between these three leading operations of the mind.

Without aiming at any symmetrical division of human life into distinct educational epochs, it may be admitted that there are three periods, each of which is characterised by the fact that the mind is chiefly engaged in one of the processes mentioned, however widely the periods may vary with regard to the time of their commencement, or their duration in different individuals. These are:

1. The acquisitive period, occupying the beginning of everyone's existence, when almost the sole intellectual function of the mind is to receive those impressions which constitute the elements of knowledge.

2. The period of elaboration, during which the feeling of the various associations and relations between those elements, acquires vigour, and the process of arrangement, including classification and analysis, or, in common language, the power of reasoning predominates over, without weakening the power of acquisition, and—

3. The practical period, when the application of knowledge to the active concerns of life gives the leading direction to both acquisition and reason, and, without diminishing either, exercises over them a controlling influence.

With the last of these periods—embracing as it does every department of human art and industry, each of which requires a special education, calls into activity peculiar powers, and engenders appropriate habits of skill, even were we competent to the task, it would be impossible for us to deal satisfactorily, in a disquisition so brief and general as the present. We may be permitted, however, to anticipate the most valuable results from the labours of the eminent and learned persons recently appointed by the Society of Arts as a committee to consider this very part of the subject.

The first, or acquisitive period, is, in many respects, the most important of the whole life. It is the period when the rudiments of all future knowledge are acquired, when the deepest foundations of the bodily and mental constitution are laid, when the entire character, physical, intellectual, and moral, receives a permanent bias towards either good or evil, which no future efforts can entirely counteract. It is at the same time that period at the commencement of which the mind is more entirely beyond the reach of tuition than at any other during life. We have, then, no means of intelligent communication with it; we can neither obtain a knowledge of its movements nor convey to it our own thoughts. The moment when we first awaken from unconsciousness, and intelligence begins to dawn upon the dim portals of our being, is hidden from us. We know, however, that before the infant can express a single intelligent thought or feeling, he must have acquired an amount of knowledge which, compared with absolute ignorance, is astonishing, and that, in order to render this knowledge available in speech, it must have undergone intellectual operations of the very same kind as those which rank amongst the most profound of which human genius is capable.

Whilst the infant lies upon his mother's lap, apparently unconscious of everything, he is acquiring knowledge with a rapidity and power which far outstrips the progress he can make in more advanced life. Observe what he learns in the course of one short year. The uses of all his own organs of sense, and the manner in which they represent one another; the properties of the innumerable objects around him, and his acquaintance with these is not merely a knowledge of them as individual objects unconnected with one another; they are united in his conceptions and remembrances according to the associating laws of contiguity, resemblance, and contrast; nay, before he can express any intelligent thought concerning any of them, he must have formed his little genera and species of the substances that gratify his appetite or disgust his taste; of the trifles that yield him amusement, or the things as trifling that excite his momentary rage, or terror, or grief; of the persons who awaken his love, or his dislike; and this by the very same mental power which, in future years, may be employed in the nicest scientific analysis and classification; nor is this all, he learns the elements of a whole language, in its purest and most idiomatic form, and begins to exercise those passions which, if properly disciplined, may afterwards render him a benefactor to his species, or, if vitiated, make him a curse and a terror to society.

Our educational efforts during this season would seem to be almost entirely limited to the judicious regulation of the physical circumstances and condition of the infant, so that the organic functions may be discharged with healthy freedom, and the mind thus brought most directly and uninterruptedly under those natural influences best calculated to foster its nascent powers. All that can be done to aid or regulate these influences, must, at this early stage of existence, be left to that maternal love which seems to have the prerogative of establishing a system of communication with the infant long before it ceases to be a stranger to the rest of its species. It is hardly necessary to observe, however, that the instinctive feelings of the mother, beautiful and interesting as they are, will be much more likely to accomplish the valuable purposes for which they were implanted if controlled and directed by an intelligent conception of these purposes, than if left to operate according to the impulse of the moment. But the numerous works which have been published upon the subject of infant treatment, render it needless for us to obtrude our counsels in this place upon the notice of the thoughtful parent. We shall, therefore, proceed to consider the mode of action to be adopted by the teacher when a sentient correspondence has been established between the mind of the child and other minds—that is, when the season of tuition, properly so called, commences.

We are still considering the acquisitive period, and for a long time to come, the chief object of training should be the cultivation of the physical powers, not only because it is of the highest importance to the soundness of the bodily constitution, but also because that soundness is absolutely essential to the healthy growth and development of the mind. This is the period, as we have said, during which the elements of all our future knowledge are stored up in the mind, and it is manifest that the purer the sensations which constitute these elements are, that is, the less they are mixed with other feelings, the more genuine and accurate will be their future combinations.

One of the conditions necessary to a deep and clear impression upon the mind is, that it should be free from all internal distraction (p. 116); but if a child be badly fed, insufficiently clothed, or suffering from some inward complaint; if the lungs and circulating system be oppressed by the foul and exhausted atmosphere of a crowded school-room, and the nervous energy depressed by imperfect vitalisation of the blood; if the eye be deprived of the natural stimulus of light, the nostrils assailed with disgusting odours, and the ear confused with an incessant tumult of noises; if one set of muscles be kept in a state of constant tension, and others in a state of relaxation, hour after hour, by sitting in a constrained position, all or any of these causes—besides that most of them plant the seeds of bodily disease and deformity—must necessarily give rise to a multitude of uneasy, anxious, and distressing feelings in the mind of the child, which effectually prevent him from attending steadily to the lesson he is expected to learn. Severity of discipline under such circumstances can only increase the evil, by associating with the lesson the dread of punishment, which the quick sense of justice children are known to possess will readily perceive to be undeserved, since with the best disposition to learn they must feel themselves unequal to the task. Hence not merely the lessons set them, but learning itself will come to be regarded as a cruel and hateful slavery,

fraught with misery and pain, and invented for the special oppression of childhood.

We will suppose, however, that all this is perfectly understood; that the great English community which has made such unexampled progress in the practical arts of life, is deeply conscious that mind is still more precious than iron or coal, or even than gold and silver; and that the art by which it is formed from rude and brutish ignorance to intelligence and virtue, is calculated to advance the happiness of society as much, at least, as any of the arts by which these inanimate materials are wrought into shapes of beauty or utility. We will suppose that all this is understood, and that the strong practical sense of England, which discerns and seizes almost intuitively upon the conditions best calculated to promote its manufactures and commerce, which lodges its material industry in places amidst the circumstances that most effectually facilitate all its processes, has given rise to a powerful public opinion, which unanimously refuses to permit that most important of all processes, which aims at moulding the rising race to habits of high morality and expanded intelligence, to be relegated from the sight of men into blind alleys, dark cellars, ruinous garrets, and forsaken habitations—localities where not one of the conditions necessary to the healthful development of either the intellect or the body can be fulfilled, and where the arbitrary instruction imparted to the mind is far more than counterbalanced by the degradation of its habits of thought, taste, and feeling, to the level of the base and sordid circumstances by which it is constantly surrounded.

When these and similar causes of internal distraction are removed, and the bodily functions are all going on easily and harmoniously, then, but manifestly not till then, will it be advantageous to attempt to meet the second condition necessary to a perfect impression upon the mind of the child, and that is, as previously stated (p. 116), to concentrate the attention upon one object at a time, however brief the time may be. We have added the latter qualification, because it is a matter of common experience that the mind grows fatigued with a rapidity proportionate to the fixity of its attention; but, then, we have also seen (p. 118) that a thorough impression may be produced in a single moment as effectually, when both conditions to it are satisfied, as it could in a year, and by one operation of the impressing cause as by a thousand repetitions. A something closely resembling the law of virtual velocities may be observed here, in accordance with which the power and the time are in an inverse ratio to each other. The best means of fixing the attention is, to make the object of it interesting to the child. At this early period of life curiosity is one of the most powerful impulses of our moral nature, and one the gratification of which yields the most constantly recurring pleasure. Now, an accomplished teacher will find no difficulty in investing the object presented to the observation of the little pupil with an interest which will awaken curiosity, and excite a vivid desire for its gratification; and this desire will, according to the principle previously laid down (p. 116), "communicate an unwonted power of concentration to the mind, and occasion a corresponding distinctness of all its perceptions."

This distinctness and perfection of the mental feeling may be essentially promoted by the proper training and exercise of the organs of sense, a task which if not performed in childhood can never be performed at all. Defectiveness of the several senses is much more common than is generally suspected. How many are those who can only imperfectly distinguish between sounds, especially when they follow one another in a harmonic series? How many, also, who are incapable of discriminating between colours, or of forming anything like a just estimate of the dimensions, form, or proportions of distant objects? It is not uncommon to meet persons in whom the lower senses of taste and smell seem to be almost wholly obliterated; and there can be no doubt that the tactual sense is subject to as many defects in various individuals, though we have not the same means of discovering them. That the senses may be brought by cultivation to a far higher degree of acuteness than they ordinarily possess has been long known, and the means by which their education may be effected range themselves under the general law before referred to (p. 114), which makes vigour and development consequent upon exercise. Each individual sense should be constantly and carefully exercised upon its appropriate objects, and the manner in which the several senses represent one another (p. 126) clearly pointed out. Our space will not permit us to illustrate the various methods by which this may be done, but they will readily suggest themselves to every intelligent and skilful teacher. If all disturbing and vitiating causes be thus removed from the channels through which we derive our knowledge, we may expect that it will flow in upon the mind in a fuller and purer stream.

Material objects and sensible events should be the chief lessons of childhood. The knowledge the pupil may acquire by the exercise of his own senses penetrates the intellect more deeply and pervades it more completely than any other, for it is the impression which nature herself makes upon the mind by direct contact. The originals and types of all erudition are stored up by direct perception; without it words could have no significancy; they are arbitrary symbols, which have no necessary connexion with the things they represent, and their power of exciting in the mind the ideas of those things depends, as we have seen (pp. 127 8), upon their association with them by contiguity. One of the most egregious and pitiful mistakes which prevail in society, is that of supposing that children are educated when their memories are crammed with words, whilst the things these words should indicate are totally unknown. The rumbling of thunder, the whistling of the winds, or the dashing of the waves upon the sea-shore, will convey more real information to the mind of the child than the most elaborate discourse, if the words of which it is composed be unassociated with corresponding ideas. The former will at least tell their own tale simply and emphatically; the latter will be a series of idle sounds, signifying nothing. A day spent at the Zoological gardens, besides the delight it would afford to children, and the advantages of air, light, and exercise, would impress them with a truer and more extensive knowledge of natural history than a year's conning from books in a close and unattractive school-room. The same may be said of the botanical gardens, and of the many exhibitions and museums of the metropolis. Even in remote places, where such institutions would be out of reach, there can be no doubt that the open fields, the woods, and the mountains, would form a scene of instruction infinitely better suited to the healthy development of both mind and body than any habitation ever raised by man.

We would have our infant-school teachers, in short, to be peripatetic philosophers in the literal sense, delivering their instructions to their pupils in the very presence of nature, surrounded by sights and sounds which bring the mind into harmony with creation, and feeling those genial influences which give delight without fatiguing either the intellect or the physical frame. That this is not always possible we admit, but that it is possible to a much greater extent than has ever been attempted, will not, we think, be questioned.

We come now to the consideration of the second educational period, which, for want of a more expressive term, we have called the period of elaboration. The phrase, however, does not inappropriately designate that period when the laws of association which govern the arrangement of knowledge acquire a degree of vigour which is plainly perceptible in all the mental operations. It would be futile to attempt laying down any general rule as to the precise commencement of this period; it varies endlessly, according to the constitution and circumstances of individuals. In some the associating laws

seem to operate even from earliest childhood co-ordinately with the power of perception, whilst in others their development is more tardy; but in all cases their operative influence is easily discernible in the direction they give to the course of acquisition. The child whose mind has arrived at this stage of growth is no longer content with a knowledge of individual objects. He wants to know their relations to one another. He seeks for causes from effects, and for effects from causes. An explanation of single phenomena is barren and unsatisfactory to him; he endeavours to classify them according to their local connexions, their successions, their resemblances, or their more abstract relations to one another. The questions he frequently puts to his teacher may be directly traced to the suggestive influence of the principles which are at the moment regulating the evolution of his own thoughts, principles which in the previous period acted subordinately to the perceptive powers, but which have now acquired over these powers a controlling influence.

We have to inquire how this great accession of energy to the mind, this general activity of all its powers and susceptibilities is to be furnished with suitable employment, which will exercise all the faculties equally, and thus produce a harmonious development of the whole.

All science is, as its name imports, the joint result of the laws of the external world, and the laws of mind. Whatever may be the nature of our inquiries, whether abstract or physical, what we call science is simply the result which they leave upon the investigating agent. It is not in the unperceived qualities or relations of things that science consists, but in the knowledge of them, that is, in the effects they produce upon the percipient mind. The revolutions of the heavenly bodies are not astronomy. The affinities of elementary matter are not chemistry. The two sciences so named consist in the intelligent cognizance of those revolutions, and of these affinities, just as the intelligent perception of the relations of numbers and quantities constitute the abstract science of pure mathematics, and not the mere fact that such relations actually exist apart from the mind. From this it is evident that instruction should not only be conformable to the facts of the external world, but that it should also be presented to the mind so arranged as to accord with the laws of thought. As in the photographic art, it is necessary for the production of a true picture, not only that there should be a surface susceptible of chemical changes upon contact with light, and in proportion to its faintness or vividness, but also that the rays reflected from the original object should reach that surface without mixture or confusion, and fall upon it at the proper angle.

The mind, by its unaided efforts, always acquires whatever knowledge it possesses of general principles synthetically, or by inferring them from a number of observed particulars, and accordingly we find that all discoveries in science are made in this manner; but when the object is not so much to make discoveries as to aid the operations of the mind by imparting to it the knowledge of discoveries already made, the analytical method, or that which descends from the general principle to the particular facts on which it rests, is the most convenient form under which instruction can be presented to the pupil, and that which most completely accords with the laws of thought. If the analysis be truly philosophical, that is, if it proceed upon the real relations of the elements of the subject, it cannot fail to call into activity all the powers of the mind in their natural order, to exercise them fully, and, therefore, to produce in them that development which should be the ultimate object of education. But when the arrangement is arbitrary and subservient to some preconceived theory — as in all schemes which profess to abridge mental effort in the acquisition of knowledge—this result cannot be expected. These schemes are all clumsy attempts to substitute one operation of the mind for another, and thus to delude it into the belief that that other has been actually performed.

Take, for example, the system of mnemonics, or "artificial memory," as it is called, with sufficient absurdity, and its whole merit will be found to consist in an attempt to substitute the process of association by contiguity or resemblance (pp. 127-8.) for that of attention. But is this a merit or a defect? We think it is a defect. In order to relieve the mind from the necessity of bestowing undivided attention upon the events, dates, or facts of which the remembrance is desirable, the mnemonical scheme associates them with objects of frequent occurrence and impressions already established in the memory. But this is merely a piece of philosophical legerdemain, by which the attention given to one set of ideas is sought to be made subservient to another set of a different character, by means of some fancied resemblance, or arbitrary juxta-position, so that the familiar ideas shall suggest those that are less common. We have already shown in our first paper (p. 116) that memory depends upon the depth and vividness of the impression made upon the mind; and that the depth and vividness of the impression depend in turn upon the amount of attention bestowed upon the fact remembered. Now, it is obvious, that if we make the attention bestowed upon the familiar facts in the first instance subserve also those which are associated with them, the inevitable consequence must be that the remembrance of the latter will be subordinate and dependant upon that of the former, but this is simply to destroy the utility of the very knowledge thus recalled. Take history as the subject of "artificial memory." The system does not profess to assist us in remembering more than prominent events, and the dates of remarkable epochs, and this it does by detaching them from the chain of incidents and causes which gave prominency to the very events, and made the epochs themselves remarkable. It takes the occurrences, characters, and actions out of their logical association with the other occurrences, characters, and actions from which they sprang, and to which they gave rise, and encloses them separately in an envelope of heterogeneous ideas, with which they have only an imaginary affinity; thus breaking the connection of cause and effect; ignoring the higher abstract relations, and destroying the very philosophy of the narrative.

But mnemonics are useless for suggesting even separate facts in their proper time and place. If we should find a chasm in our historical reminiscences, for example, how are we to discover the event or action which should fill it up. The context does not suggest it; we must have recourse to the mnemonical symbol, but how are we to find out the particular symbol of the fact we are in search of? It is evident that unless we suppose it always present to the mind, which is absurd, we must have a second mnemonical contrivance to recall the first, and a third to recall the second—mnemonics upon mnemonics *ad infinitum*; and when the whole creation had been exhausted, we should only have reduced to chaos and confusion that which was beautiful and orderly in its first arrangement.

We have chosen history as an example of what "artificial memory" can do to assist the mind, and we have seen that that assistance is utterly delusive; that, instead of "philosophy teaching by example," it converts history into a broken jumble of isolated ideas, which can no longer be regarded as a record of human conduct and its consequences—moulding human conduct, and issuing in consequences more remote, which cannot reveal to us the delicate and subtile connexion that has so often linked that which was most trivial with that which was most momentous in the occurrences of the past, or expound to us the manner in which ages have expanded from the ages that preceded them. But it is not in history alone that mnemonics are thus deceptive. To whatever subject it may be applied, the system is equally objectionable, because of its incompetency to grasp the finer relations of ideas, or to assist the mind in recalling either facts or

events in their natural connexion and sequence. Nor is it to mnemonics alone that this objection applies; it lies in its full force against all short methods and royal roads to science. Nothing can relieve the mind from the necessity of giving suitable attention to the subject of study, without enfeebling the faculties relieved, destroying our reliance upon them, and inducing a helpless dependency upon artificial expedients; nor can the natural order of the mental operations be inverted without producing imperfection and confusion in the knowledge we may acquire.

We have said that the analytical form is the most natural and convenient under which instruction can be presented to the pupil, but its adoption does not necessarily imply the exclusion of the synthetical. We shall endeavour to show how both may be combined, so that they shall exercise every faculty of the mind, and leave upon it a deep and enduring impression.

The whole subject should be proposed in the first instance, not in a bald logical definition, but in a brief and perspicuous description, every word of which should be explained and illustrated, until it was thoroughly understood and firmly grasped by the pupil. This description should not only be short, but also single, not mixed up with any other subjects, either by reference or allusion, so that it may possess that unity of character which is necessary to a deep and distinct impression upon the mind (p. 116). When the general nature of the subject is clearly comprehended by the pupil, we may proceed to separate it into its principal divisions, and for this a knowledge of the laws of thought is absolutely essential, for if the division be not made in accordance with these laws, it will be arbitrary, if not whimsical, and certainly unnatural. Some of these laws are suited to one subject and some to another, and in many subjects they must all have their influence upon our arrangements, but in every case the success of our analysis will depend upon our having conducted it in accordance with the mental principles appropriate to the subject, or to the parts of the subject. The divisions of geography or topography, for example, must be made with special reference to the principles of association by local contiguity (p. 128); those of history in accordance with the principle of association by succession or contiguity in time (p. 128). The classifications of natural history depend upon association by resemblance (p. 128), and yet in each of these subjects there is room for the exercise of all the principles which regulate the operations of the mind, whilst in the more abstract sciences we shall find that that principle of the mind which perceives and seizes—not so much upon things themselves as upon their various relations to one another, is the principle guide in arrangement (p. 129).

Having formed our primary divisions, we must take each of them and perform upon it a similar process of separation, still adhering steadily to the rules furnished by the appropriate laws of thought, and thus from one subdivision to another, until the subject is reduced to its simplest elements. The order in which the several divisions and subdivisions should be treated will depend upon a variety of circumstances, as well as upon the character of the subject itself. In some it must be the order of practical importance, in others that of nearness, in others the order of development and dependency, as their relations to one another vary.

Each lesson should be short, to prevent fatigue; should, if possible, contain but one topic, to secure unity, and be pleasingly expressed and illustrated, to win attention When the lesson contains two or more topics they should be perfectly homogeneous, so that they would arise in the mind as one conception, and at the close of the lesson the pupil should be carefully examined upon its particulars. The advantage of this will be that what had before passed through the mind analytically will now have to pass through it synthetically; and the elements to be again combined into a whole. The pupil will thus have become acquainted with the subject under two different aspects and from two opposite points. He will first have had a bird's eye view of it in its entire extent, relations, and proportions, and next he will have examined all its particulars individually.

The outline of science thus impressed upon the mind will be of incalculable value, not merely on account of the genuine knowledge of the science which it involves, but also because of the intellectual discipline by which it is acquired. It penetrates the mind with a sense of order and congruity amounting almost to a new faculty; a confidence in its own energy which facilitates all future acquirements, and resembles that marvellous property possessed by all living things, which enables them to select from the most heterogeneous elements those only which are exactly suited to their nature, and best adapted to promote their growth and vigour.

We had intended to offer some further observations on the formation of habit and the management of the emotions, but our limits forbid us to enter upon these subjects. If we have succeeded in showing the essential importance of a knowledge of the mind to education, considered either as a science or an art, the object of these papers will have been accomplished, and still more completely should they induce some reader of the Journal, with competent talent and leisure, to undertake the composition of a simple manual of mental science which may be available to teachers generally.

THE LAW OF PARTNERSHIP.

The Leeds Chamber of Commerce held a special meeting at the Court House, on Wednesday, the 10th January, for the purpose of discussing, and ascertaining the opinions of the members upon the question, whether any and what alterations and amendments should be made in the law of partnership, as regards the rival principles of limited or unlimited responsibility of partners. The chair was taken by Darnton Lupton, Esq.; and the gentlemen present included Charles Bousfield, E. Irwin, W. Firth, H. Oxley, W. Baxter, and W. Burniston, Esqrs.; and Mr. M. Cawood, the secretary.

Mr. Cawood stated that on the 23rd of October a circular had been received by him from the Secretary of the Royal Commission appointed to inquire and consider what alterations should be made in the law of partnership, requesting to be furnished with the names of gentlemen belonging to the Chamber to whom certain questions should be addressed upon the subject, the Commissioners being desirous of eliciting the individual views of the members rather than the collective opinion of the whole body. In consequence of this communication the names of Mr. Bousfield and Mr. Irwin had been forwarded to the Commissioners, and the two gentlemen named were requested to answer the questions. These gentlemen, he believed, had prepared their answers; and the present meeting had been convened to consult upon the matter.

The Chairman explained that in July, 1851, a Committee of the House of Commons, after hearing evidence, had requested her Majesty to appoint a Commission to inquire into the propriety of altering the law of partnership, the establishment of improved tribunals to decide questions between partners, and to consider the question of limited or unlimited partnership. The evidence given before the Committee asking for this Commission was summed up very briefly and very fairly in the *Edinburgh Review;* and the Secretary, at his request, read that portion which referred to the question of partnerships with limited liability, as they now exist in France, Holland, America, Italy, some parts of Germany, and to a small extent in Ireland. Although this form of partnership had not been known in England, yet an act of Parliament was passed in the year 1782, legalising them in Ireland; but they had not been numerous—not more than 130 such partnerships having been formed since 1816, or an average of three or four per annum. Every person in England who joins with others in a mercantile or industrial undertaking, no matter to how small an extent,

or how much he may desire to limit his responsibility, is liable for the debts and engagements of the partnership—to use the words of Lord Cottenham—"to his last shilling and his last acre." Those who gave evidence in favour of a law of limited partnership, among other reasons urged the desirability of establishing a system which would enable a person so disposed to embark a portion of his capital in some enterprise of commerce, manufactures, agriculture, &c., upon condition of having his proportionate share of the profits, if successful, and of losing his venture, and *no more*, in case of failure; and it was contended that such a law would prove beneficial to a country in many ways, in expanding industry and commerce, and in the accomplishment of works of public utility and value which would never, under the present system of unlimited liability, be undertaken. These witnesses therefore suggested the passing of an act legalising partnerships upon the principle known in France as "*en commandite*," or partnerships in which in addition to the managing partners—who incur unlimited liability, as in England at present—there are non-active, sleeping, or subscribing partners, who are liable only to the extent of the capital they put into the concern, and no further.

The Chairman, after the digest of the evidence had been read, said that Mr. Mill argued that this would be most valuable in all establishments where there were talented and zealous workmen, because those workmen could be taken into partnership "*en commandite*," and thus induce an identity of interest between both parties in working the concern. But it appeared to him (the Chairman) that great difficulty would arise in the position which the workman-partner should take; for if he were a partner in the usual acceptation of the term, he would be interfering in the management of the business, which the responsible partners would scarcely like, whilst, if he were still a workman, he would be liable to dismissal. No doubt a law which would admit of persons uniting together for some public, philanthropic, or benevolent object, and subscribing a given sum, without being liable to anything beyond the sum subscribed, must prove beneficial. For example, it was proposed by some gentlemen in Leeds, not long since, to erect improved dwellings for the working classes, but they were stopped at the threshold by the fact that they could not erect these houses, and limit the responsibility of the subscribers or partners. But he was decidedly of opinion that if this principle were imported into commercial and trading partnerships, it would induce parties with small capital—and especially the working classes—to rush into schemes of the most wild, visionary, and ruinous nature.

Mr. Bousfield was also unfavourable to the principle of partnerships *en commandite*, because the system was not calculated to improve the condition of or enrich the working classes; because the present system had worked well for those engaged in commercial and trading pursuits, had caused the mercantile honour of England to stand first in the world, and had been the means of enabling men of perseverance and business habits to raise themselves from the ranks of the working classes to prosperity and affluence; because it was calculated to add to the riches of the great capitalists, who would, by leaving a portion of their fortunes in trade, reap 10 or more per cent., instead of being content with 2½ to 4 per cent., as at present; and because there was plenty of capital and credit to be obtained by parties who could show to bankers that they had embarked in business with fair prospects of profit and success. He thought it would be advisable to have some plan which would afford facilities for limited partnerships for the accomplishment of public objects, such as reclaiming waste land, building model houses for the working classes, or other objects of a kindred nature: but he believed limited partnerships for carrying on the ordinary trade of the country would be inexpedient. Mr. Bousfield also expressed the opinion that a law should be passed making it penal for persons to engage in trade without keeping books. Their bankruptcy and insolvency courts furnished frequent instances of parties who committed great frauds upon their creditors, and attempted to screen themselves by asserting that they kept no books. If it were made imperative upon Commissioners to send to gaol all persons who were proved before them to have carried on business without keeping books, much would be done towards destroying a prolific source of recklessness and fraud.

Mr. Firth differed with the Chairman and Mr. Bousfield as to the desirability of the principle of limited partnerships; and speaking from personal experience of its operation in the United States, he declared that it had worked well. He knew several instances in America of young men of energy and talent, but whose capital was too small, entering into special partnerships with capitalists, and after three or five years paying off these special partners, and in this way laying the foundation of their fortunes. He knew many concerns, including those of some of the most eminent mercantile and manufacturing persons in the United States, whose business had been commenced in this way. He knew that capitalists in America were always ready to enter into these special partnerships, and that the managing partners were always anxious to pay them off as soon as possible. Some re-arrangement of the law of partnership was imperative in England. In his own establishment—and it was the case in almost every large concern—there were young and deserving men to whom it would be very advisable to give a pecuniary interest in the concern, but the present law of partnership, with its unlimited liabilities, and its difficulties of various kinds, rendered the admission of these young men extremely hazardous. They did not wish to subject these young men to all the rigid rules of partnership, and yet they would like to give them an opportunity of joining in their concerns; but to that end an alteration in the present law of partnership was absolutely requisite. Both the Chairman and Mr. Bousfield had referred to the risky character of transactions wherein this limited liability existed. His answer to that was a very short one. During the last fifteen years, in all the transactions of his firm with the United States, the losses by bad debts did not amount to 6d. per cent., and almost every concern with which his firm was trading in America, was organised under this principle of special partnerships.

Mr. Irwin was of opinion that the Irish law on this subject might be extended to England very usefully, but he would limit the number of partners to eight. He considered that such a law would be of value, as enabling old partners, who had made their fortune, to retire, and give young and deserving men, who were trustworthy and of energetic and business habits, a chance of raising themselves. He would have such partnerships registered, and the registry rendered easy of access. Mr. Irwin entered into a detail of the mode of working these partnerships, but his propositions did not very materially differ from the French partnership *en commandite*. He did not approve of the principle of partnerships of this kind with working men, believing that they would be injurious, because the few acting partners would be running risks they ought not, and keeping the others in the dark until all the capital might be lost. He considered it very dangerous for a large number of working men to embark in business, entrusting their savings to a few individuals; but he was of opinion that public joint-stock companies should be upon the limited-liability principle, with easy access to the registry and balance sheets of the company.

Mr. Oxley, Mr. Burniston, and Mr. Baxter expressed their concurrence generally in the views of Mr. Bousfield; and the meeting terminated with an intimation from the Chairman that if the Royal Commissioners made a recommendation to Parliament, and steps were taken in the Legislature thereupon, the members of the Chamber should be convened together for the purpose of considering the propriety of petitioning Parliament or memorialising the Government upon the subject.

Home Correspondence.

ENGLISH COTTON TRADES, INDIGENOUS OR EXOTIC?

SIR,—In the days of Elizabeth a law was made prescribing various modes of punishing "sturdy beggars" who refused to work; and also providing parish help for those who could get no work to do. So it is clear that there were "strikes" in those days, and also occasional lock-outs, as well as now. A strike is *per se* evidence of an improved condition, and a determination not to go back from it, if the strikers can help it. The aristocrat in Shakspeare had a perception of this when he said

"The resty knaves are overrun with ease
As plenty even is the nurse of faction."

And however unpleasant strikes may be to the well-to-do, they are always indications of a rise in the condition of general humanity. There must be something wrong in the philosophy of wages, when a first-class weaver can only earn 14s. per week, and a second class 11s., while a Sheffield mechanic can earn from three to five pounds. Not a satisfactory condition for the weavers, but one they should strive to escape from by all means in their power, even were it to leave the general community without shirts, while they embarked for Australia at 20s. per diem, could they raise the passage money, and there were no hope of betterment.

There is a point in the political economy of nations that seems to have escaped notice. In manufacturing nations there are certain arts that are based on conditions of nature, and certain others that are wholly artificial. Mother-wit and energy lead certain nations to discover what is the next move in supplying the wants of mankind on a large scale. Certain yellow-skinned people in Calicut and elsewhere grew and picked, and spun and wove, cotton, into long-cloths and muslins, and the discoverer, Albuquerque, and those who came after him, brought those dazzling white fabrics westward, and astonished all Europe with them. Years afterwards a certain Richard Arkwright, a barber, who shrewdly knew how to shave his trade as well as his customers, by "low price and quick return," invented, or borrowed without leave, an invention, which took the twirling spindle out of the hands of country wenches, and married it to a mountain stream, with manifold multiplication. Richard Arkwright's after-coming allied these mechanical spinning jennies to Watt's steam engine, and multiplied weavers wove the twist in cottage looms; but soon the power-loom came forth, and—Luddites notwithstanding—it increased and multiplied, for the whole world needed to be supplied with shirts, with no nation but England to help them. India herself became a receiver, instead of a supplier of her own original manufacture. Mills rose on mills, and a new race of millions of workpeople arose, whose prosperity or adversity was all dependent on the supply of cotton and the demand for cotton cloth. So far as regards the home supply this is a natural trade, but as regards the supply of other nations it is mostly an artificial one, depending on temporary circumstances.

The natural export trade of a country is that in which the natives of a country work up native materials or productions. The artificial trade, in which they work up foreign materials which the natives of the country that produce the materials could pursue to greater advantage, can scarcely be permanent. It can only endure while these people are in a state of ignorance, as the whole world but England once was with regard to machine-wrought cotton. The people of the Southern States of the American Union supplied us largely with cotton. We took it into our heads to tax food, the manufacture of America, and the Americans in return taxed our manufactures, and set up cotton-mills to work up their own cotton in the Northern States, giving the cotton-growers a rival market. We had people in greater surplus than had America, and thought they could compete with us in their own and foreign markets, in articles of much material and little labour we still kept possession. But it was only because our people were worse off than theirs. They could compete in mills and machinery, but not in hands, while passenger transit was dear, and America a myth to all but a few of our workers. But France, Germany, Italy, Spain, all in turn, set up the cotton-mills grown familiar to the general world. In the early periods we made laws to prohibit the export of machinery, thinking to keep all the world dependent on us; but it was trying to hedge in the cuckoo. As each country in turn became familiar with the trade, most had their little competition in the world's market, and, had all circumstances been equal to ours, we must long ago have succumbed or have reduced our people to a lower condition than the people of other countries. The result now is that the cotton-trade is more a speculative mercantile than a manufacturing trade, and labour is cut down. By our large capital and constant improvements in machinery diminishing more and more the total amount of labour and lowering the rate, we may still go on competing, but the time must come when we can do no more, and those nations, with a better natural aptitude, will take up the operations which we performed for them in their nonage. And new nations will take to the work, which is, in truth, only on a level with hand-sewing. It will not be long ere Southern planters will erect their own mills, and, employing their own negroes, sell their cotton in webs instead of in bales. It will not be long ere Manchester men export their machinery to India; and we may yet hope to see the slave trade extinguished by the powers of English capitalists joining native rulers, in order to convert African cotton into English shirtings, making black men too valuable to illuse or kill. What Egypt's Pacha has accomplished in Egypt—a wiser man—President Roberts, may perchance accomplish in Liberia. The cotton-trade has been only a graft, not natural to the soil, and is fast wearing out. The facility of emigration must ultimately crush it. Even the advantages of dwelling in England may be too dearly bought by each day's wage of Australia being as much as the scanty pittance for an English week. The world's slaves and serfs are not yet extinct, and cotton-growing and working are more analagous to them and to the warm climates than to England.

This doctrine may be held as treason, but it is truth. Is it worth the while of the nation to keep up an artificial race of people for the purpose of competing with inferiors in the lowest kind of employment? Are we happier or better because numbers of our brethren earn a scanty living at over-competed cotton, while we have a deficiency of hands to work at coal and iron?

What shall we do with them? it will be asked. Of a verity not as we did with the hand-loom weavers—weary them out with hope deferred. Not as Hood did with the sempstresses, the shirt makers—try to write the public into compassion for them. No! rather let us denounce the whole thing, as Cobbett did "Ireland's lazy root," and buckle us to a combat of a more manly kind, —the developing new sources of industry into which machine weavers may be draughted. If France, or Germany, or America, or Africa, or Asia, possess people who can weave cotton for a rate of payment, we decline, let us once buy it of them, and pay them for it in tools and machinery, and ships, and agricultural implements, and railway plant.

It is desirable that the system of men working only at one trade should cease, and the practice be obtained of fluctuating to other employments. The production of food is becoming a mechanical as well as chemical process, and the workers in mills are convertible to workers on farms. By machine processes special manipulators—human machines—are less needed, and in proportion as facilities offer for new employments, the old and effete will gradually drop off. All trades and pursuits not indigenous or natural, which are only artificial, and which other

nations can pursue to more advantage, will cease as soon as employment is free, and the working people can readily change from one employmeht to another.

We have been so long accustomed to regard the cotton manufacture as our staple trade, that we cannot readily recognise that it is not indigenous to us, but rather belongs to other nations of more delicate temperament, with slight and taper fingers, for whom our business is to make the machinery. There was a time when Norwich was a stronghold of French Hugenots, who manufactured their textile fabrics. For some especial reason the trade ceased, and Norwich is a locality of many houses and few tenants; but not therefore do Norfolk farmers cease to thrive. It is not mere numbers, but quality, that we should look to in our people as well as in our cattle. The old fable that "one Englishman could beat three Frenchmen" had a meaning in it in the time of the elder Bourbons, and we ought to train and educate our people, that however true may be the text, "that the poor shall never cease from out of the land," still they shall only be the disabled poor, and not poor from the want of a consistent round of employment.

These things must be thought of, and the remedies applied, even though the pride of Lancashire will scoff at the idea of the possibility that grass may grow in the streets of Manchester, fish sport in the Irwell, and rooks sentinel the smokeless brick stalks. They will change their trades ere that comes to pass.

I do not think, with the Young England poet, that our "old nobility" can stand us in entire stead, while "laws and commerce die," but it is desirable, that while we try to "hold on to the actual," we should make sure that it be really the actual, and not the transient. If we can make our shirtings cheaper than others, and pay good wages, let us go on, but it would be too serious a matter to try to bolster up the cotton trade, as was tried by the sempstresses on the eve of the advent of sewing machines. The quarrel of the employers and employed over a failing trade, which is certainly the case at present, if the employers speak truth, would be more than an absurdity. And if the return of peace should bring a temporary prosperity to the cotton trades, it will also set the continental nations more actively at work to compete with us. Let it not be supposed that it is in fear of England's prosperity that I speak—she does not yet trust wholly to cotton—but this, also, is one of the questions that wise workmen and wise employers would do well to analyse. The careless working man brings up all his sons to his own trade; the cautious workman looks out for as many trades as sons, and thus effects his insurance. My own belief is, that there is yet in the world so large an assemblage of human serfs growing up out of savages, that competition in the common labour of textile fabrics, especially cotton, will have the effect of transferring the free English workman to newer and higher employments, even though the wrecking of emigrant ships and the wholesale destruction of passengers, should become a normal condition of transit, and preclude them from reaching Australia. Trusting that both employers and employed will consider in the coming conference this possible phase of their condition amongst others, and quite sure that nature will vindicate her own laws, whether they consider them or not—possibly the great law that nations and productions were made diverse, to the end of a mutual dependence and bond of union,

I am, Sir, yours faithfully,
W. Bridges Adams.

1 Adam-st. Adelphi, Jan. 24, 1854.

STRIKES AND LOCK-OUTS, AND LIMITED PARTNERSHIPS.

Sir,—The Society of Arts could not more timely and beneficially exercise their acknowledged influence than by affording a neutral ground for the discussion of subjects of such high and practical importance as those of capital and labour, technically designated by the words Strikes and Lock-outs.

Industrious men, spurred by a laudable desire to better their condition, with increasing families and heavy expenditure on one hand; and manufacturers, whose duty it is to calculate the costs of raw produce, wages of labour, rents, interests of money, and risks on the other, have for some time laboured under disastrous disagreements, which cause large losses, extensive misery, and considerable derangement of trade.

The great question at issue is,—How much is labour worth? Are present wages reasonable and just? if not reasonable, are the operatives justified to strike for higher wages? or would it be desirable to establish another relationship between employers and employed? The value of labour is naturally governed by the supply of labour and the demand for labour. The more competition exists in the labour market, the lower will be the wages. The greater is the demand for labour, the higher will be its value. The supply of labour is mainly affected by population. An extensive emigration alters, therefore, the relative value of capital and labour, and wages must necessarily rise, But the value of labour is also governed by the demand for labour. This demand is governed by the prosperity of the home trade, and by the extent of, and profits accruing from, our exports to foreign countries. The latter, again, are governed by the want that those countries have for British goods, by their ability to pay for them, by the price at which they can themselves produce similar articles, or at which they can purchase them from other countries..

That the increase of our exports is dependant upon the cheapness of the prices of British goods is sufficiently acknowledged. The extension of machinery abroad, and the stimulus given to manufactures in France, the United States of America, Germany, Italy, are well known, and they are only arrested by their want of coal and capital. Labour they possess sufficiently cheap. If the dearness of labour in this country raises materially the value of British goods, they will strive to increase still further their own productions; or, failing that, they will turn themselves to other quarters whence they may import them at lower rates. There may be therefore solid reasons for the unwillingness of the masters to grant constant advances in the wages of labour. They see that they would thereby endanger their operations, and that they would risk the entire loss of many markets. But, whatever be the source of disputes between the masters and operatives, are the latter justified in striking? I shall not dispute their right to set any price they choose on their labour, and to refuse working at lower wages; but are they right to measure the worth of their labour without reference to the circumstances which governs the demand for it? It is the neglect of this consideration that renders them so peremptory in their demand for advances. They do not think that the interest of the employers and the employed are identical—that if our exports do not pay, or if our customers are suffering either by dearness of provisions or political convulsions, our trade is seriously affected, and in its turn the wages are lowered. They are easily led from appearances of prosperity, and their demands are consequently opposed. There is another ground upon which sudden advances are dangerous. Many are in all classes improvident. The profits of prosperous times are seldom set apart for bad times. If the wages of the operatives were always to be regulated by the profits, heavy fluctuations would arise, and our operatives would find it hard to submit to reductions. I believe that these strikes are, in most cases, the result of the misconduct of a few individuals. They sow the seeds of discord, and mislead numbers of those who would otherwise be content to prosecute their labours, thanking God for their daily bread. Against such individuals the authority of the law should be rigourously enforced.

The Fourth question is, would it be desirable to estab-

lish another relationship between employers and employed, or masters and servants? Would it be a desirable to put the servants in the capacity of limited partners?

Partnership is a generic term. There may be a partnership of capital and capital, or capital and labour, in a trading adventure. General partnership is constituted when two persons agree to put together capital or labour, and become jointly liable for their obligations. Limited, or *commandite* partnership is created when one or two individuals, possessing some capital and industry, obtain the support of a number of individuals, each of whom contributes a given sum, in proportion to which he is to participate in profits and losses. The managing partners have an unlimited responsibility, but the *commandite* partners do not risk more than the amount subscribed, provided they do not appear in the management. Anonymous partnerships are those where a number of individuals agree to prosecute a public work, and they each take shares in the undertaking, and choose their own manager. The difference between the two kinds of partnership is, that in the former the partnership draws its source from the industry or special position of the managing partners, in the latter from the nature of the undertaking. The management of the former rests with the general or ostensible partners; that of the latter in one or more agents chosen by the shareholders. In both the liability of the shareholders is limited to the amount they have subscribed.

Now, in all kinds of partnership, first, there must be the union of something valuable, say capital and labour—a partial or entire joint management—risk and responsibility on the part of all. To apply these observations to the relation between masters and operatives:—First, the master risks all the capital. The operatives risk their labour; but whilst the master may lose his capital and still be a rich man, if the operative lose the wages of his labour his means of livelihood perish. It would be, moreover, injurious to the regularity and management of labour in factories were the workman charged with a responsibility or thought which would prevent him from bestowing undivided attention to his labour, to say nothing of the insubordination which might ensue. Arrangements are often made between principals and clerks, whereby a certain salary is secured, and a proportion of the profits. But when a clerk has attained a position to claim a proportion of the profits besides his salary, not only is he above want, but he is certain of abundant employment.

To remove the anomalies which at present exist in the law, in the carrying out of these agreements, without rendering the clerk liable as a partner, some measures will, I trust, be recommended by the Royal Commissioners now inquiring into the state of the law of partnership.

Another essential in a partnership is the management. Even in a limited partnership *commandite* partners may inspect accounts, attend meetings, and exercise a certain amount of control, which it seems to me is incompatible with the character of an operative.

I am in favour of introducing partnership with limited liability into this country, but I do not conceive they would work well in factories or mills. I believe that any attempt to abolish the relation of masters and servants must prove fruitless, as it is a divine institution, upon which the whole structure of society is founded.

Now as to the means of preventing the occurrence of strikes. The first and best means is a conscientious discharge of the duties on the part of the master. That, together with the success of their operations, they should have the well-being of the operatives under their serious consideration, is, beyond doubt, a primary duty.

It is suggested to obtain the establishment of local Boards of Trade for the settlement of disputes between employers and employed. If such arbitrations are to be voluntary, the difficulty will be to choose sound arbitrators. Perhaps local boards of arbitration, composed of employers and employed, presided over by a stipendiary magistrate, might prove of great utility.

This is another illustration of the want of tribunals of commerce—a question which will in all probability be introduced into the House of Commons next session. As to the restricting of the hours of labour, I am against any government interference, as I believe that masters and operatives are the best judges of what they can do consistently with their interest and their health.

The question is one of the utmost importance, and it behoves all parties seriously to consider all its bearings before they come to any conclusion. One great fact need be kept prominently in view—that if 10,000 people strike they lose every day, say at 3s. a day each, £1500, or £9000 per week; and therefore I should say that it is far better for a workman to get even 3s. a day, than get nothing for two months whilst striving for 3s. 6d. a day.

Yours faithfully,

LEONE LEVI.

Proceedings of Institutions.

Deptford.—The Members of the Mechanics' and Literary Institution held their Annual Meeting on Wednesday, the 11th January, when the Report of the retiring committee, with a financial statement, was read by the Secretary. The report stated that the circulation of works of fiction preponderated over those of more solid usefulness; but, in contrast to this, the attendance at scientific and instructive lectures had increased in a satisfactory manner. The reading-room had also been well attended. Mention was made of the many advantages that had occured from the connection with the Society of Arts, and that these advantages would in all probability be increased. The classes did not appear to be progressing in a manner altogether satisfactory, but this was occasioned in a great measure by the want of further accommodation. Stress was laid upon the necessity which manifested itself for a more rigid economy in the expenditure, and that members should make a principle of subscribing during the summer as well as the winter months. There had been no falling off in the amount of subscriptions for the past year. The meeting was adjourned till Thursday evening, when the officers of the Institution for the ensuing year were elected by ballot.

Wandsworth.—The Second Annual Soirée and Exhibition of the Literary and Scientific Institution was held on Tuesday, the 10th instant. Professor Moseley presided, and drew attention to the various advantages which the Institution had offered during the past year. Twenty lectures had been delivered, viz.:—"Engineering Achievements of the 19th Century," by Mr. H. Gore; "Porcelain," by Mr. M. Blackmore; "Electricity," by Mr. G. B. Sampson; "Readings from Sir Bulwer Lytton," by Mr. W. Harrison; "Sydney," by the Rev. H. J. Hatch, M.A.; "Astronomy," (two lectures,) by Mr. D. F. Walker; "Combustion," by Mr. A. Coleman; "Popular Errors," by G. D. Longstaff, Esq., M.D.; "War and Warriors," by Mr. W. Bramall; "Palestine," by Mr. J. Silk, Buckingham; "Education of the Blind," by Mr. Stidolph; "Man," by Mr. W. Brook; "Crime and Punishment," (two lectures,) by Mr. C. Pearson; "John Howard," by Mr. Bramall; "Music," by Mr. G. Barker; "Constantinople," by Mr. M. Blackmore; "Heat," by Mr. A. Coleman. Several useful classes had been held at the Rooms. The library had been considerably augmented, and the museum had received many valuable additions. It was gratifying, the Chairman remarked, to see what the Institution had achieved during the past year, and to feel that a considerable amount of useful information must have been imparted. Education had worked many important reforms in the upper classes. Fifty years ago the head of a family was seldom to be found at the domestic hearth, but now no longer did his chair remain vacant; he would be generally

seen after the toils of the day, reading some interesting book to his family, or the newspaper, the character of which had become as altered as his own. He regretted, however to say, that he too often saw in the houses of the working classes, when the fire was burning brightly, and every thing presented as comfortable an appearance for the owner's position of life, as his fireside did for him, that the arm-chair was empty, and that the occupier would possibly be found where fifty years ago his employer resorted. Literary and Scientific Institutions were, he believed, well calculated to infuse a taste for intellectual pursuits among the working classes, and to make their hearths present the same attractions for them as his did for him. Among the numerous objects exhibited were valuable specimens of Sèvres and Dresden Porcelain, from S. Rucker, Esq., Chinese Manufactures and carvings, from Professor Moseley, Messrs. Hewitt & Co., of Fenchurch-street, and others. Paintings by Sir E. Landseer, Turner, and other eminent artists. Photographic drawings, from J. Turner, Esq., the Society of Arts, &c. An extensive collection of philosophical apparatus, objects of natural history, antiquities, &c., &c. Selections of vocal and instrumental music were introduced upon the occasion, and also upon the two following evenings when the Exhibition was opened. The attendance was very good, and many members of the neighbouring Institutions, which have agreed to the interchange of privileges, were present.

MEETINGS FOR THE ENSUING WEEK.

MON. Actuaries, 7.—Discussion "On Decimal Coinage."
London Inst., 7.—Dr. A. W. Hofman, "On Organic Chemistry."

TUES. Royal Inst. 8.—Professor Tyndall, "On Heat."
Civil Engineers, 8.—Mr. J. Pigott Smith, "On Macadamised Roads for the Streets of Towns."

WED. Lond. Inst., 2.—Mr. T. E. Malone, "On Elementary Chemistry."
Society of Arts, 8.—Discussion on Mr. T. Webster's Paper, "On Laws relating to Property in Designs and Inventions; and the Effect of such Laws on the Arts and Manufactures."
Geological, 8.—1. Professor Ramsay, "On the Occurrence of Gold in North Wales." 2. Captain Strachey, "On the Physical Geology of the Himalayas."

THURS. Zoological, 3.
Royal Inst., 3.—Professor Wharton Jones, "On Animal Physiology."
London Inst., 7.—Professor Tyndall, "On Magnetism and Electricity."
Antiquarian, 8.
Photographic, 8.—Anniversary.
Royal, 8½.

FRI. Botanical, 8.
Architectural Assoc., 8.
Royal Inst., 8½.—Mr. W. R. Grove, Q.C., "On the Transmission of Electricity by Flame and Gases."

SAT. Asiatic, 2.
London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany."
Royal Inst., 3.—Professor Miller, "On the Chemistry of the Non-Metallic Elements."
Medical, 8.

To Correspondents.

ERRATUM.—In last number, page 142, col. i. line 8, for "*Rusbrook*, Capt. the Hon. George, M.P.," *read*, "R*ushout*, Capt. the Hon. George, M.P."

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, 20th January*, 1854.]

Dated 29th August, 1853.

2004. J. H. Johnson, 47, Lincoln's-inn-fields—Gluten. (A communication.)

Dated 22nd November, 1853.

2712. R. Adams, King William-street—Firearms.

Dated 6th December, 1853.

2832. G. Ross and J. Inglis, Arbroath—Looms.

Dated 30th December, 1853.

3025. B. Swire, Ashton-under-Lyne—Metal tips for shoes and clogs.
3027. J. Marlor, Oldham—Ascending and descending mines and shafts, &c.

Dated 31st December, 1853.

3029. J. Holroyd, Sowerby Bridge—Singeing textile fabrics.
3031. H. V. Physick, 38, North Bank, Regent's-park—Electric telegraphs.
3033. J. Pym, Pimlico—Grinding ores, &c.
3035. A. Trueman, Swansea, and J. Baggs, London—Grinding, &c., gold quartz.
3037. J. Holbrey, Bradford—Combing wool, &c.
3041. A. Oppenheimer, Manchester—Silk velvet and piled goods.
3043. P. Sonntag, Paris, and 4, South-street, Finsbury—Apparatus for measuring and fitting garments.
3045. S. T. M. Sorel, Paris, and 4, South street, Finsbury—Compositions as substitutes for caoutchouc, &c.

Dated 2nd January, 1854.

1. C. H. Collette, 57, Lincoln's inn fields—Sugar. (A communication.)
3. A. Dawson, 14, Barnes place, Mile End Road—Converting small coal, &c., into blocks of fuel.
5. P. A. Montel, Paris—Stopping trains on railways.
7. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Water wheels. (A communication.)

Dated 3rd January, 1854.

9. J. Madeley, Walsall—Tubes and nuts and heads of screws.
11. J. Stovold, Barnes—Sifting gravel, &c.
13. E. J. Willson, 477, Oxford street—Portfolio, music books, &c.
15. J. J. Grylls, 3, Murton street, Sunderland—Whelps for capstans, &c.

Dated 4th January, 1854.

19. D. Hulett, High Holborn—Gas regulators.

Dated 5th January, 1854.

21. J. Liddiard, Deptford—Prevention of smoke.
23. D. B. White, Newcastle upon Tyne—Waterproof fabrics.
25. W. Rigby, Glasgow—Steam hammers and pile driving machinery.

Dated 6th January, 1854.

29. J. Pearse, Cawsand, Cornwall—Navigating ships.
30. H. H. Edwards, Ludgate hill—Peat, &c., for the purposes of fuel, &c. (Partly a communication.)
31. R. Tait, Glasgow—Ornamental fabrics.
32. J. Radcliffe, Stockport—Looms.
33. J. Healey, Bolton le Moors—Spinning machines known as mules. (A communication.)
34. M. Poole, Avenue road, Regent's park—Dextrine, glucose and alcohol. (A communication.)
35. J. D. M. Stirling, Larches, Birmingham—Iron manufacture.
36. A. V. Newton, 66, Chancery lane—Motive power engines and pistons. (A communication.)

Dated 7th January, 1854.

38. W. E. Newton, 66, Chancery lane—Dyeing, &c. (A communication.)
42. N. M. Carall, Glasgow—Ornamental fabrics.
41. H. S. Edwards, Paris—Textile fabrics. (A communication.)

Dated 8th January, 1854.

46. Z. Pettitt, Fordham, Colchester—Thrashing machines.
48. R. Husband, Manchester—Ventilating hats.
50. R. Howson, Manchester—Screw propellers.

Dated 10th January, 1854.

52. E. Tyer, 3, Rhodes terrace, Queen's road, Dalston—Signals on railways by electricity.
54. A. M. E. B. E. Ducros and O. Vedeau, Paris, and 16, Castle street, Holborn—Compounds for dyeing.
56. Rev. W. R. Bowditch, Wakefield—Purification of gas.
58. A. Mitchell, Belfast—Propelling vessels.
60. A. Drevelle, Halifax—Combing machines. (A communication.)

Dated 11th January, 1854.

62. A. A. Masson, Paris—Gold or silver lace.
66. W. Watt, Glasgow—Application of heat to drying purposes.
68. R. A. Brooman, 166, Fleet street—Extracting gold from the ore. (A communication.)
70. M. Vetillart, Le Mans, France—Drying woven fabrics, &c.
72. F. Tussaud, Paris, and 16, Castle street, Holborn—Universal pump press.

WEEKLY LIST OF PATENTS SEALED.

Sealed January 14th, 1854.

1584. Philip Hart, of Brierly Hill—Improvements in the manufacture of coke.
1675. George Humphery, of Brighton—Improvements in regulating the supply of water for water closets.
1679. Benjamin Looker, junior, of Kingston-on-Thames—Improvements in the manufacture of bricks.
1682. Robert Gordon, of Heaton Norris—Improvements in furnaces used with steam boilers, for the purpose of consuming smoke and economising fuel.
1683. Henri Joseph D'Huart, of Longwy, and of 16, Castle street, Holborn—Improvements in the manufacture of pottery.

Sealed January 16th, 1854.

1699. Henry Lamplough, of Gray's inn lane—Improvements in the preparation and manufacture of certain effervescing beverages.
1705. John Wallace Duncan, of Grove end road, St. John's wood—Improvements in adhesive soles and heels for boots and shoes, and in apparatus used for preparing and applying the same.

1706. Isaïe Alexandre, of Bruxelles and Birmingham—Improvements in metallic pens and penholders.
1745. William Ireland, of Leek—Improvements in the mode or method of melting or fusing iron or other metals, and in the apparatus employed therein.
1769. Charles Cummins, of 148, Leadenhall street—Improving clock escapements.
1863. Samuel Hall, of 16 Chadwell street, Pentonville—Improvements in furnaces.
1903. John Henry Johnson, of 47, Lincoln's inn fields, and of Glasgow—Improvements in dyeing or colouring textile fabrics and materials, and in the machinery or apparatus connected therewith. (A communication.)
1914. Edward Finch, of Bridge Works, Chepstow, and Charles Lamport, of Workington—Improvements in the masts and rigging of ships.
2326. William Beardmore, of Deptford, and William Rigby, of Glasgow—Improvements in steam engines.
2335. James Webster, of Leicester—Improvements in water guages for steam boilers.
2591. Humphrey Chamberlain, of Kempsey, near Worcester—Improvements in the manufacture of bricks and tubes or tiles.
2605. Samuel Mead Folsom, of Massachusetts, U.S.—A new or improved instrument for ironing clothes or various other articles.—(A communication.)
2645. John Cameron and James Napier, both of Loughor, Glamorgan—Improvements in obtaining gold and silver from ores, alloys, or compounds containing such metals.
2653. Philip Hill, of Gravel House, Coggeshall—Improvements in weaving plush and other piled fabrics.—(Partly a communication.)
2685. Henry Richard Cottam, of 1a, Sussex terrace, Hyde park gardens—Improvements in the construction of portable houses.
2717. William Pegg, of Leicester—Improvements in instruments for cutting out parts of garments and other articles, and in grinding and sharpening cutters for the same.
2722. John Fielding Empson, of Birmingham—Improvements in the manufacture of wire.
2730. Thomas William Kinder, of Dublin—Improvements in the construction of the permanent way of railways.
2738. Elmer Townsend, of Massachusetts, U.S.—New and useful improvements in machinery for sewing cloth or other material.—(A communication.)
2747. John Henry Johnson, of 47, Lincoln's inn fields, and of Glasgow—Improvements in carding engines for carding cotton and other fibrous material.—(A communication.)

Sealed January 18th, 1854.

1710. Samuel Perkes, of Walbrook—Improvements in the construction of portable metallic folding bedsteads, chair-bedsteads, chairs, sofas, couches, settees, and such like articles for the use of emigrants and others; and part of which improvements are applicable to ordinary bedsteads, sofas, couches, chairs, and such-like articles in general.
1717. Edward Dalton Smith, of Hertford street, May Fair—Improvements in crushing and washing ores and earths.
1793. John Shae Perring, of Bury—Improvements in the permanent way of railways.
1808. Matthias Edward Bourd, of Crayford—Improvements in supplying ships or other vessels with water, air, or ballast.
2668. Charles Burton, of New Oxford street—Certain improvements in hand and draught carriages for common roads.
2819. Charles William Hockaday, of Port Hall, Brighton—Invention of a certain chemical compound or compounds, applicable as a remedy or remedies for scorbutic and other affections of the human body.

Sealed January 19th, 1854.

1712. Peter Armand Le Comte de Fontaine Moreau, of South street, Finsbury—Invention of a new mode of fastening buttons to garments, and an improved button, and also in machinery for manufacturing the same.—(A communication.)
1714. Charles Breese, of Birmingham—Invention of a method of forming designs and patterns upon papier-maché, japanned iron, glass, metal, and other surfaces.

Sealed January 20th, 1854.

1729. James Murdoch, of 7, Staple inn, London—Improvement in stamping or shaping metals.
2025. Richard Archibald Brooman, 166, Fleet street—Improvement in paddle wheels.
2437. Samuel Lloyd, the younger, of Wednesbury—Improvement in the construction of turn-tables.
2549. John Moffat, of Birmingham—Improvement or improvements in candlesticks. (Partly a communication.)
2687. Richard Stuart Norris, of Warrington, and Ebenezer Talbott, of Crewe—Improvement or improvements in the manufacture of iron.

Sealed January 21st, 1854.

1723. John Lilley, of Thingwall—Separating the refuse vegetable matter contained in the stalk and leaves of the plantain species, and also trees grown in tropical climates, from the fibrous material of the same, in order that the latter may be manufactured into ropes or cordage, and for other purposes for which hemp and flax are used.
1724. William Birkett, of Manningham Mills, Bradford—Method of cleansing or purifying and treating soap suds or wash waters so as to fit them to be again used for the washing of wools and other similar matters.
1725. Simon Charles Mayer, of Paris, and of 16, Castle street, Holborn—Improved domino bearer.
1728. Edward Cockey, Henry Cockey, and Francis Christopher Cockey, Frome—Improvements in the manufacture or production of cheese.
1732. John Gillam, of Woodstock—Improvements in apparatus for cleansing and separating corn, grain, and other seeds.

Sealed January 23rd, 1854.

1739. John Hall, of Bedford—Improved mangle.
1741. Samuel Barlow, junior, of Stakehill, and John Pendlebury, of Crumpsall—Improvements in machinery or apparatus for bleaching or cleansing textile fabrics or materials.
1744. Alexander Clark, of Gate street, Lincoln's inn fields—Improvements in regulating the speed and indicating the power of steam and other motive power engines.
1898. George Peel and Robert Brownhill, both of Manchester—Improvements in air-pump buckets, and in valves for steam engines and other purposes.
1963. John Whiteley, of Stapleford—Improvements in warp machinery for the manufacture of textile fabrics.
1989. James Hill, of Stalybridge—Improveme ts in machinery used for spinning, doubling, and winding cotton, wool, flax, silk, and other fibrous materials.
2171. Charles Collins, of Hartford, U.S.—Manufacture by machinery of tubes from leather or other suitable flexible substance, chiefly for covering the drawing rolls of spinning machinery, but also applicable to other purposes.
2423. John France, of North Wharf road, Paddington—Improved morticing machine.

Sealed January 25th, 1854.

1778. William Wild, of Salford—Improvements in machinery or apparatus for covering rollers used in the manufacture of cotton and other textile materials, with leather, cloth, or other substances.
1794. Samuel C. Lister, of Manningham—Improvements in machinery for washing wool and hair.
1822. George Armitage, of Bradford, Yorkshire—Improvements in the construction of presses.
1846. Richard Christie, and John Knowles, both of Fairfield, Lancashire—Improvements in the manufacture of terry, cloth, or other woven fabrics having looped surfaces, and in the machinery or apparatus connected therewith.
1862. Thomas McSweeny, of America square, London—Improvements in the construction of ships and vessels.
1894. Robert Smith Bartleet, of Redditch—Improvements in apparatus used in sewing.
2272. Alexander Tariff, of Paisley—Improvements in retarding apparatus for the prevention of accidents on railways.
2328. John Colin Sharpe, of Paisley—Improvements in retarding apparatus for the prevention of accidents on railways.
2622. Stephen Barker, of Birmingham—Improvement or improvements in shaping metals.
2644. John Liddell, of Glasgow—Improvement or improvements in power-loom weaving.
2648. Joseph Fry, of Cannon street West—Improvement in preparing solvents for India rubber and gutta percha, and in rendering waterproof fabrics free from odour.
2718. Francis Arding, of the Albert Iron Works, Uxbridge—Improvements in machinery for cutting, splitting, and bruising vegetable substances.
2740. Daniel Lancaster Banks, of St. James's place, Toxteth park, Liverpool—Improvements in rotatory engines.
2742. Davidson Nicholl, of Edinburgh—Improvements in the manufacture of envelopes.
2808. George Collier, of Halifax—Certain improvements in looms for weaving.
2810. Samuel C. Lister, of Bradford, Yorkshire—Improvements in combing wool, hair, cotton, and other fibrous materials.
2812. Jonathan Saunders, of St. John's wood—Improvements in the manufacture of rails for railways.
2838. John Hargrave, of Kirkstall, Yorkshire—Certain improved apparatus for washing and scouring wool.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854.				
Jan. 19	3553	A Plugged Jar and Cover	Betty & Co.	101 and 102, Leadenhall street, City.
„ 20	3554	Portmanteau	Henry Greaves	Birmingham.
„ 23	3555	American Envelope	Waterlow & Sons	London Wall.
„ „	3556	A Dispatch Writing Case	Henry Hill and Richard Millard	7, Duncannon street, London.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 3, 1854.

NINTH ORDINARY MEETING.

Wednesday, February 1, 1854.

The Ninth Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 1st instant, Harry Chester, Esq., in the Chair.

The following candidates were balloted for and duly elected:—

Ashburton, Lord.
Barnard, John Edward.
Blandford, Marquis of, M.P.
Blount, John Patterson.
Brady, John, M.P.
Cairns, H. M'Calmont, M.P.
Caldicott, ——.
Capel, Rev. George.
Chanter, John.
Childs, James.
Clark, Daniel Kinnear.
Collins, Henry George.
Donovan, Charles.
Festing, Richard Grindal.
Finch, Henry Young.
Freeman, Robert.
Greenwell, G. Clementson.
Harris, Henry Edward.
Huntingdon, James.
Huxtable, Rev, Anthony.
Lawes, John Bennet.
Lockhart, A. Elliott, M.P.
M'Lauchlan, Frederick Holt
Matthews, William.
Nichols, George Alexander.
Phillips, Capt. Michael.
Saye and Sele, Rt. Hon. and Rev. Lord.
Sells, Edward Perronet.
Silk, George Charles.
Simms, W. A.
Turner, Richard.
Wilson, Frederick J.
Wingfield, John.
Wrey, John William.

As a Corresponding Member.
Bowring, His Excellency Dr. John.

Previous to resuming the discussion on Mr. Webster's Paper, adjourned from the last meeting, the Secretary called attention to a series of Portraits (oil paintings and engravings), which were hung round the room, as being the commencement of the collection now being made by the Council at the suggestion of His Royal Highness the President to form the Gallery of Inventors.

THE PATENT LAWS.

ADJOURNED DISCUSSION.

The Chairman stated that, in order to give as many gentlemen as possible an opportunity of expressing their opinions on this important subject, it had been resolved to restrict each speaker to fifteen minutes; and though as a general rule a gentleman could only speak once on the same subject, he would first call upon Mr. Prosser, as the few words addressed to them by that gentleman at the close of the proceedings at the last meeting could scarcely be considered a speech.

Mr. Prosser felt that it was impossible to do justice to the subject, either in fifteen minutes or an hour, and he would, therefore, respectfully decline to offer any further observations.

Mr. Wordsworth said, that on the occasion of their last meeting, Mr. Denison had remarked that the paper was so metaphysical and philosophical, that it was difficult to follow it. It might be so to some extent, but he (Mr. Wordsworth) accounted that to be its great praise; for though it might detract from its utility as regarded suggestions for the amendment of the law, it did not detract from the excellence of the paper itself. He therefore begged to tender his unqualified praise to Mr. Webster for what he had brought before them, though he almost wished that the paper had been made a little more practical, and that it had alluded more to the improvements required in the patent laws, which nobody understood better than Mr. Webster. Perhaps, however, that gentleman intended to read another paper, containing suggestions for such amendments at a future meeting of the Society; and he was sure that, should he do so, it would be of great interest and utility. After Mr. Webster had read his paper last week, the meeting was addressed by another friend of his, Mr. Denison, in opposition to the patent laws, with great ability, and he had this advantage over those who were to come after him, that he had been allowed to address the meeting 50 minntes, whilst they were to be confined to 15. Mr. Denison, in opposing the patent laws, spoke against property in patents, which, he said, ought not to be allowed to exist, whilst he at the same time argued for property in copyright. Surely that was scarcely consistent, for if there was a copyright in the one there ought to be in the other. His friend's arguments were so fallacious on this point, that he felt they ought to be exposed. He said, "Every book that was published assisted those who came after, and if one man wrote a good book upon any subject, it did not prevent another person writing a better or a worse; all that he was prevented doing was, the copying the work of another; whilst the patent laws said that whilst a patent was in existence no person should make a similar article to that patented." He maintained that no greater mistake than this had ever been made by any person addressing a public assembly. Why a copyright interfered as much with another person, as a patent could possibly do, for a patent did not prevent any person producing another machine to accomplish the same results as the one patented. All that the law said was that they should not copy the same arrangement of the machinery. It was therefore altogether erroneous to say, that a patent stood in the way of another inventor: and he was surprised that Mr. Denison had made such a statement. Mr. Denison, in his attacks upon the patent laws, stated that they created a monopoly, and he gave the most outrageous example to support his views which could be conceived. Mr. Denison was known to be a man of talent, and therefore if he made a speech full of fallacies it was the duty of every one to endeavour to expose them, and place the matter fairly before the public. He had thought proper to refer to soke mills, which existed in different parts of the country, and, comparing them to the patent laws, said, they had been productive of nothing but difficulties and litigation. Everyone knew that soke mills originated in ancient times, when the lord of the manor thought fit to erect them for the use of his retainers, or all those who went to reside on the manor. No man, however, was compelled to reside there or till the soil, and therefore not to grind his corn at these particular mills. There was a monopoly, however, still existing, resulting from a patent which Mr. Denison might have fairly attacked, viz., a patent granted, by Charles the Second to one of his illegitimate offspring, in the post-office, and which was held by the nobleman who descended from him. It was not necessary, however, for him to refer more particularly to a case like that, as it had nothing to do with the patent laws. Mr. Denison founded an argument against the patent laws, on the assertion that the majority of patentees lost money; but that was no reason why they should not give encouragement to others to invent and improve inventions. The argument of Mr. Denison, carried to its legitimate conclusion, would overturn the whole property of the country. Because they were called upon to afford protection and encouragement to inventors, did they in any way injure those who had no such property to protect? He considered, however, that the real question for them to consider was, how far the patent laws could be improved, and that he thought was a proper subject to be taken in hand by the Society of Arts, who had already done much good in that direc-

tion. The Society had done much good in the years 1850, '51, and '52, by the admirable reports they had published on the law of patents, and which had given to the world much useful and interesting matter on the subject. It appeared to him that the law of patents ought to be taken as established, and their endeavour should be to see what improvements could be made in it, and, more especially as it affected artistic copyrights. He wished to address a few words on this subject, as there were a large number of persons connected with the arts—painters, engravers, and sculptors—whose property in their productions was very imperfectly, or altogether unprotected. How great were the number of persons interested might be gathered from the fact, that, in the course of the season of 1853, there were exhibited in London no less than 4,168 objects of art, the work of 1,952 artists, exclusive of what were exhibited in the provincial towns, Ireland, Scotland, and other parts of the British dominions. Now these parties were hardly protected at all, and it would scarcely be believed that sketches of Mr. Martin's picture of Belshazzar's Feast were sold, and some years afterwards prints were engraved from them, one of which W. bought, and had it painted in colours, on a large scale with dioramic effects, and exhibited it for money, as Mr. Martin's grand picture of Belshazzar's Feast, and Mr. Martin had no means of preventing him; for upon his filing a bill in chancery, the court decided that the Engraving acts did not apply to such a case as that, and refused to grant an injunction to restrain W. from exhibiting his copy, and representing to the public that it was the work of Mr. Martin, until the right had been established at law, at the same time observing, that if Mr. Martin had exhibited his picture as a diorama, he might have been entitled to an injunction. Could anything more unjust than that be imagined. There were five Acts of Parliament for the protection of copy-right in works of Art, the first of which was obtained through the exertions of Hogarth, the father of art in this country. Upon obtaining that Act, Hogarth published a small print with emblematical devices, and bearing the following inscription:—"In humble grateful acknowledgment of the grace and goodness of the legislature, manifested in the Act of Parliament for the encouragmeent of the arts of designing and engraving, obtained by the endeavours, and almost at the sole expense of the designer of this print, in the year 1735, by which not only the professors of those arts were rescued from the tyranny, fraud, and piracies of monopolising dealers, and legally entitled to the fruits of their own labours; but genius and industry were also prompted by the most noble and generous inducements to exert themselves—emulation was excited, ornamental, compositions were better understood, and every manufacture where fancy has any concern was gradually raised to a pitch of perfection before unknown, insomuch that those of Great Britain were at present the most elegant, and the most in esteem of any in Europe." It was curious that, notwithstanding that act obtained by Hogarth, and four others which had been since passed, painters and engravers were still very inefficiently protected, and sculptors had no protection at all. A good deal had been said about there being no right of property in inventions, but he hoped he should not be overstepping the mark laid down by the Society for this discussion, if he claimed for every man the right of property in his own productions. Why should not such a work as that of Belshazzar's Feast be protected from piracy. Why any one could copy the works of another, and dispose of the engravings for a profit, without the original painter having the power to prevent him, or obtaining any benefit from it. What he considered was wanted, was, that the law should be so amended both with regard to patents and copyrights by which a cheap and expeditious protection should be obtained at common law.

Mr. Winkworth rose to advocate opinions which, he was afraid, were held by only a small minority of the meeting; and seeing the powerful advocates he had to contend with, he feared it would be almost impossible for him to do justice to the cause he had in hand. There could be no doubt that that part of Mr. Webster's paper which referred to the origin of property was, as it had been truly described by Mr. Denison and Mr. Wordsworth, more metaphysical and philosophical than practical. It was, however, necessary that we should have a correct definition of the origin of property, in order to arrive at a just idea of its nature. His idea was that the origin of property might be referred to the separate or joint exercise of physical or mental superiority, the former establishing occupancy, the latter creating wealth by fashioning the materials in and on the earth in such form, and for such purposes of convenience or luxury, as the maker or inventor might desire. With this definition, no doubt, Mr. Webster would be satisfied. It was unnecessary, for the purposes of this discussion, to inquire how far, if at all, what was called natural justice was compromised or violated by an exclusive possession of what would seem to be, *ab initio*, the equal right of all. It was sufficient that we recognised, as admitted, that what a man claimed as his own by creation, purchase, or descent, and could prove to be so, he ought to be protected in the enjoyment of. The real and primary question at issue was this—whether the less tangible results of intellectual activity, as developed in inventions in art and manufacture, had any claim to protection beyond what the law afforded to all rightful possessors of material property, such as the iron, wood, brass, or copper, of which their inventions might be composed. In their raw and inert state these materials were comparatively of small value, but when manufactured or combined into certain forms, the value might become infinitely enhanced. Whether, however, these materials were of greater or less cost to the owner, he was not compelled to part with them at less than the value he set upon them, or even at all; but when he had so done, they were, or ought to be, no longer his property, but that of the purchaser, who, in his turn, ought to be at liberty to sell them again, or to make as many fac-similes as his interest or convenience might dictate. It was with the inventor to do what he would with his own: in the state of the law which he (Mr. Winkworth) contended ought to exist, he would know the penalty of parting with it. But if for a moment we admitted that an inventor had as much right to protection in the monopoly of his invention, after it had by his own act passed out of his hands, as the owner of land or other property, how was it that the law only gave him a temporary or limited interest in it? Simply because the law did not recognise that natural right to which he erroneously laid claim, and only granted it by way of encouragement or reward for ingenuity, very often to his own injury, and greatly to the damage of the community at large. If he had the same right as the owner of real or personal property, the law was guilty of a gross injustice by limiting the period of his enjoyment of it. So much for the present as to the principle. Let us glance for a moment at some of the evils resulting from the theory of patent right, falsely so called:—1. It compelled the liberal inventor to take out patents to protect himself in the enjoyment of his own discoveries. This was exemplified by the case of Mr. Scott Russell, who stated, in the chair of that Society, that he was forced to take out patents for his own protection, though he did not agree with the theory of patent right. 2. It prevented or deterred him from improving on existing inventions. 3. It encouraged persons of small means to embark in speculations in their own real or supposed inventions at a ruinous cost; and it was shown by Mr. Prosser, that not one patent in one hundred paid the inventor, so that parties were drawn into speculation merely in the hope of obtaining a prize. 4. The patentee of an invention of value was too often obliged to fight or buy off pirates at a large

cost of time, anxiety, and money. This was illustrated by Mr. Denison, by reference to the evidence of Mr. Ricardo, with regard to the Electric Telegraph Company. They had expended £200,000 in buying up patents, yet fresh inventions and improvements in telegraphs were so constantly being brought before the public, that he believed they were now obliged to abandon that expensive policy. 5. An ingenious man sometimes supposed that he had made a discovery—and to himself it was a discovery—and believing it to be so, he patented it. Scarcely had he done this, and begun to exercise his newly-acquired right, than he was informed that the thing was not new, and that, though the original patentee had not hitherto availed himself of his right, he (patentee No. 2) might use his own patent at his own peril. That was illustrated by Mr. Denison, by reference to Sir Joseph Paxton's sash bars, and the large volume of specifications of reaping machines produced to them by Mr. Prosser, who said that a better reaping machine than any yet invented had originated with one Pliny, 30 years before Christ, from which it would appear that all subsequent inventions and improvements were piracies thereupon. 6. A patentee, whether justly or unjustly so, had the power, which he too often exercised, of charging exorbitantly for his presumed invention, under pretence of indemnity. 7. It was the interest of inventors not to confer with others, who could assist them with advice that might make their inventions really valuable. Hence the many imperfect and valueless machines. 8. The supposed necessity for couching specifications in terms, sufficiently comprehensive to embrace every possible modification of the invention, and yet so general and mysterious as to defy all power of understanding it. Hence the interminable injunctions in Chancery, issues directed to be tried at common law, and other expensive and harrassing results, by which some £200,000 or £300,000 per annum was wasted. He had received a communication so germane to this point from Mr. George Brace, who had been largely occupied in the amendment of the old law, and who had intended to have spoken had he been able to be present, that he would read an extract to the meeting:—

"The Society of Arts has done much in mitigating the evils of the *law respecting the obtaining of patents*. But the Society has done NOTHING touching the protection of men when they have got their patents. Think of the crying evil as regards the costly remedies for infringements and invasions. A. B., an inventor, has his bantling attacked; he has then to go and instruct an unskilled attorney; the attorney, when up in the case, has to instruct an equally unskilled barrister; two or three barristers have then to apply the forcing process to a judge profoundly ignorant of the subject; and they have also to enlighten 12 jurymen, who are, perhaps, equally ill-informed of the real merits of the scientific subject submitted to them. However, the barristers, judge, and jury come to a decision at an enormous expense, and the whole is perhaps upset by a piece of solemn mummery called a Bill of Exceptions. Then comes an immense amount of legal trifling—a new trial and costs—perhaps ruin. Now, why not let a tribunal appoint a standing jury, if you like of five or seven men, conversant with the subject? Let the case be stated by the litigating parties, subject to legal direction by an assessor. The five or seven legal men would settle most subjects in an hour, that now occupy years, and at a cost marvellously small. Take a page out of the French system—have *Conseils de Prudhommes*."

Mr. Winkworth then concluded by saying that he trusted the time was not far distant when the whole system would be crushed under its own weight. Already the facility for cheap provisional protection was so great that thousands rushed to avail themselves of it, under the delusive hope of a profitable investment of their talents, and he confidently expected that 'ere long, even the common mechanical appliances for eating and drinking would be patented, so that we could only perform those necessary operations with the sword of Damocles hanging over our heads in the shape of an injunction in chancery, all which might be profitable fun to Mr. Wordsworth and Mr. Webster, but would be death to us. We might rest assured that the man of real genuis was a true patriot, and would not hide his talents under a bushel. If the patent laws were abolished to-morrow, there would be more useful inventions than ever, for talent being no longer bound by the fetters of monopoly, and breathing a freer atmosphere, would find its true position and exhibit itself in forms to astonish, delight, and improve the world.

Mr. COLE said Mr. Winkworth had told them that his object was to put an end to patents altogether, and then he went on to say, that if they did not, there would be so many articles patented that they could not take a meal without using a patented article. Now he (Mr. Cole) maintained that all property ought to be protected, though there might be inventors, such as Brunel, who could invent whatever he wanted, who might consider the patent laws unnecessary. Why should they abolish a right which had been recognised for four or five centuries in all civilised countries—amongst them, Spain, Austria, France, and the United States. He looked upon it that there was very little difference in property the result of labour, and any other kind of property, with regard to its right to to protection. Indeed, those who advocated the contrary opinion, had evidently founded their notions of right on the views of Louis Blanc and other socialists, that no property had a right to protection. Jeremy Bentham had, in his opinion, very ably shown the right of inventors to protection, in a few short and pithy lines, in which he said, "*In new inventions, protection against imitators is not less necessary than in established manufactures protection against thieves. He who has no hope that he shall reap, will not take the trouble to sow. But that which one man has invented, all the world can imitate.*" If two savages were following prey, and one, more skilful than the other, killed, he took it as his right, yet he did not create that property, neither had the land been created by man, but it had merely been taken in by-gone ages by the strongest, and yet property in land was now acknowledged and protected. The inventor, however, created his property; he brought into existence that which was previously unknown. The law said that a man should be protected for his labour, and surely because he and Mr. Winkworth might arrive at the same results from their labour, that was no reason it should not be protected. Whoever patented the invention first would be protected in it; but then the law said, as two persons might hit upon the same invention at the same time, the patentee should only be protected for a limited period, and then it should be open to all the world. He could not understand why the result of intellectual labour should not be equally protected with other property. If a labourer got a shilling for paving the streets he was protected in the enjoyment of it, and surely those who devoted their minds and energies to patents were equally entitled to protection. Such patents could not fairly be called monopolies, as some of their opponents had designated them; and this was clearly laid down by Mr. J. Stuart Mill, in his "Principles of Political Economy." That gentleman said:—"The condemnation of MONOPOLIES ought not to extend to patents, by which the originator of an improved process is permitted to enjoy, for a limited period, the exclusive privilege of using his own improvement. This is not making the commodity dear for his benefit, but merely postponing a part of the increased cheapness which the public owe to the inventor, in order to compensate and reward him for the service. That he ought to be both compensated and rewarded for it will not be denied, and also that if all were at once allowed to avail themselves of his ingenuity, without having shared the labours or expenses which he had to incur in bringing his idea into a practical shape, either such expenses and labours would be undergone by nobody, except very opulent and very public-spirited per-

sons, or the state must put a value on the service rendered by an inventor, and make him a pecuniary grant." And further on he said, "No limit can be set to the importance, even in a purely productive and material point of view, of mere thought. . . Intellectual speculation must be looked upon as a most influential part of the productive labour of society." In looking over the observations of Mr. Denison, he found that he alluded to those foolish inventors who believed they had discovered something when they had not, and therefore argued that no man ought to have a patent. But what did Jeremy Bentham say on that point:—"These insults and oppressions (alluding to the charges for chaff-wax, &c.) have sometimes been approved, as tending to repress the *temerity* of projectors; in the same manner, taxes upon law proceedings have been applauded as tending to repress the *temerity* of suitors: as if *poverty* were synonymous with *temerity*—as if the rich only had need of the assistance of the laws, or that they only were worthy of it—as if, indeed, this reason for only half-opening the doors of the temple of justice were not equally conclusive for closing them altogether!" Mr. Wordsworth had very properly called attention to the little protection enjoyed by the artist; but he might have gone further, and added what was a fact,—that if a man painted a picture, and some thief got into his room and copied it, and afterwards got it engraved, not only could the artist not prevent him, but the copyright would be held to be in the person of the original publisher, and the artist would not be allowed to engrave his own picture. In his opinion the whole question resolved itself into the injunction contained in the eighth commandment, "Thou shalt not steal." If he produced a result from labour, what right had any man to take it from him, or claim to enjoy it with him? It mattered not how he procured that result, the law ought to protect him. It had no right to say that it would protect one class of property only. The law ought not only to protect but to encourage inventions, as by them a good was done to society which all ultimately enjoyed.

Mr. Steer hoped that they were not, in the 19th century, going back to the practices of the time of Elizabeth, and establish monopolies in inventions. Everybody now denounced monopolies. Look at the tea monopoly. When the advocates of throwing open the trade said by doing so they could get tea cheaper, the monopolists went to the Chancellor of the Exchequer, and said, "We pay a good lumping sum to the revenue, and you have no trouble, which will not be the case if the trade is thrown open." Indeed, all monopolists argued that their own monopoly was for the benefit of society; but they were contrary to the spirit of the age, and it was the duty of every man to endeavour to get rid of them. Did not the landowner say that he ought to be protected, and that they were wrong in receiving corn from abroad. Yet the monopoly was abolished, and tea had been reduced one-half in price, and bread was half the price it used to be. (A voice—"Not at present.") That reminded him of another great practical benefit to the public. Did Mr. Mechi ever ask for a patent for his improvements in agriculture? No; he threw them open, and let them come before the public with a fair stage and no favour. Mr. Wordsworth had called their attention to the fact that artists were very inefficiently protected, but was the Royal Academy closed because they could not patent the result? It appeared to him that this was a struggle involving a great principle of free trade. Formerly no man could make a tub unless he had been apprenticed seven years to the trade of a cooper; neither could a man make a coat or a waiscoat unless he had been brought up a tailor. Latterly, such ideas were scouted; and the sooner the market of inventions was thrown open the better. There appeared to him to be two objects in this discussion: one whether monopolies should be allowed to exist, and the other, if they were to exist, whether any improvements could be introduced into the patent laws. He was of opinion that they should be done away with altogether, but if not, that they should be so amended as to give as little trouble as possible to the patentee in proving his rights. He would suggest that, where a patentee complained of his patent having been infringed, it should be referred to some competent authority, such, for instance, as a committee of the Society of Arts, to determine whether it had been infringed or not. If that tribunal found that the patent had been infringed, then the case might go before a jury to determine the amount of compensation to be awarded. It should never be left, as at present, to a jury to determine upon the question of infringement, for no one could go in Guildhall when a patent case was being tried, without being struck by its absurdity. A declaration was drawn and averment made, and a witness put in the box, but the counsel dare not ask him any questions, instructions being either to obtain or defeat a verdict. The counsel had to consider the temper of the judge, the temper of the jury, and, above all, endeavour to get a verdict from a body of men who, probably, understood nothing about the question before them. That, however, would not be the case if, in the first instance, questions of infringement were referred to such a tribunal as the Society of Arts. It seemed as if the advocates wished to go back to the days of Elizabeth, monopolies of which were, in some measures, abolished and regulated by the laws of James, which, by the system of licenses, gave validity and protection to property in inventions. He was an advocate for doing away with the patent laws entirely, but if that could not be done he should be happy to see them put on a better and more intelligible system.

Mr. Nesbit denied that, as he understood the word monopoly, a patent could be so called, or that there could be a monopoly in property. He considered a monopoly to be a union of persons to prevent others doing a particular thing; but the possession of property he had never looked upon as a monopoly. Indeed, he thought if it were so, that they had a right to a monopoly in their wives and families; which, it would appear, would be disputed by these anti-monopolists. Mr. Winkworth had been somewhat metaphysical in his definitions of property; but a person might have a property which was not visible; he had a monopoly in his ideas so long as he kept them to himself. The anti patent party appeared to admit the justice of copyright; but no man had a copyright in ideas, but only in the peculiar form in which he put them upon paper. If 20,000 men were to have the same idea, and put it on paper in a different form, each form would receive the protection of copyright. So, also, was it with the patent laws. They could not patent the principle, but only the peculiar form of its application. If one man patented an article, and another arrived at the same result by a different application of the same principle, he would not be prevented from enjoying the benefit of it. Surely, then, if property was to be given to ideas expressed upon paper, it ought also to be given to ideas expressed in inventions. One part of the argument of Mr. Winkworth was that there could be no property in inventions without law. Why, as to that, there could be no property in anything without law, though the property in inventions was limited, because other parties might have arrived at the same result, therefore it was held that they should not be entirely deprived of the benefits. What did they pay the police rates for but for the protection of property? And if it was to be argued that patents were to be done away with because of the number of pirates ready to seize upon inventions, then he might be allowed to ask whether the protection of property was to be neglected because of the number of thieves who were ready to seize upon it and divide it among themselves. Mr. Denison's arguments were altogether a tissue of fallacies. He said "there was this difference between copyright and the patent laws. Copyright interfered with nobody, but the patent laws did. Every book

that was published assisted those that came after, and if one man wrote a good book upon any subject, it did not prevent another person writing a better or a worse. All that he was prevented doing was the copying the words of another." Could anything be more fallacious? Let them see how well that sentence would read if applied to patents. It would run thus:—"Every invention that was patented assisted those that came after, and if one man patented a good invention, it did not prevent another person patenting a better or a worse. All that he was prevented doing was the copying the work of another." Now, could there be a more total fallacy than was contained in the arguments of Mr. Denison? He would not, however, pursue that subject, as the whole matter had resolved itself into this whether or not a man ought to have a property in his ideas, no matter in what form they might be expressed, or whether the patent laws should be abolished. He thought there could be no doubt that, on all principles of sound policy and justice, they ought to be retained. Those laws had, of late, been much improved, through the exertions of this society, the press, and other parties; and he hoped they would yet be much more simplified and improved.

The Chairman here said that, as there was a gentleman present who had accompanied Mr. Whitworth in his mission to the United States, to report on the New York exhibition, he should be very happy to hear his opinion upon the subject under discussion.

Mr. Hasler, having been called upon, would do his best to respond, though he had not expected to have had to address that meeting. He would confine his observations as closely as possible to the subject before them, and only allude to the patent laws of the United States so far as they might be interwoven with it. The arguments of the gentlemen who opposed the patent laws, resolved themselves into this—that they were obstructions, and that all obstructions were bad. Patents were necessary to the protection of property in inventions; and all property was, to some extent, an obstruction. Blackstone laid it down, that any person having property could exclude another from it; indeed, he might surround it with a wall, and that wall would be an obstruction to a person who might wish to pass on the property. All property was open then to the charge of its being an obstruction; and yet, nobody would think of arguing from that, that therefore the protection of property should be abolished. If a man's ideas when placed upon paper were protected, surely they had an equal right to protection when wrought into a tangible form. The example of one republic—Switzerland, had been cited as a reason why there should be no patent laws; but Switzerland was in a peculiar position, she could filch from her neighbours, whilst she had nothing to give in return; and, of course, she had, therefore, an objection to allow a foreigner to patent inventions in her territory. When in the United States his inquiries had been specially directed to the patent system in that country. He had had the honour of assisting Mr. Whitworth of Manchester in drawing up his report on the subject; and therefore could say, that the patent laws were objects of peculiar care in the United States. The very first article of the constitution declared that it was desirable for the promotion and progress of the useful arts that there should be secured to authors and inventors exclusive rights in their works for a limited period. He thought that the example of such a country as the United States, which had placed its broad seal of approbation on the patent laws, worthy of attention. He was now dealing with facts: and to show, under a system of patent laws, how invention flourished in the United States, he might mention, that in 1852 a thousand patents were taken out, and the Minister of the Innterior, a minister answering to the Secretary-of-State for the Home Department, reported that these inventions had been inquired into, and 200 of them found to be useful and worthy of notice; and he further reported, that the general principles of the patent laws of America gave universal satisfaction. Now, he thought such an authority could not be undervalued, and must have great weight with all who considered the question. He did not say that there might not be defects in American patent laws, as there were in those of England; neither did he say that there were not men in America who disapproved of them. In a country to which many of the revolutionists of 1848 had fled of course, the opinions of communism and socialism would prevail, and those who opposed the patent laws had borrowed their opinions from that class of society; and he thought, they might not inaptly also adopt the motto of the socialist leader, "La propriété c'est le vol."

Mr. Stansbury had risen to speak before the last gentleman, but was glad that he did not catch the chairman's eye; because, as a citizen of the United States, he would not have liked to have stated so much as Mr. Hasler had done, for fear those tendencies should be attributed to him for which his countrymen were said to be so remarkable. It had been said aptly and correctly, that a man of science had no country, and the tendencies of the times were to bring the whole civilised world together as one great family; and, as such, advanced the position of the human race, by extending knowledge in every possible manner. In a complete state of society, it was stated, they ought to give up a portion of their own enjoyments for the benefit of the world; and therefore it was that inventors were invested with a monopoly in their inventions only for a limited period of time. If it had not been for the lateness of the hour, he had intended to have taken up the American law, and gone into the system of preliminary examination, &c.; but he hoped that it would not be lost sight of by that society, and that every opportunity would be taken of endeavouring to make the law as perfect as possible.

The Chairman having suggested that it would be as well again to adjourn the debate,

Mr. Campin rose to move the adjournment, and expressed a hope that the discussion for the next evening might be confined as nearly as possible to the means of improving the law. The law, as it at present existed, was found wanting in everything, excepting in the reduction of expense, which it had accomplished.

Dr. Caplin called attention to the advantages of the patent law of Belgium, where a patent was not granted until it had been examined by a competent committee of 30 persons, whose verdict determined the right of the applicant for a patent.

Mr. Webster thought that the observations of the last and other speakers, relative to improvements in the patent laws, most valuable, and that they should, in future, address themselves to the question of what was the best system, and how it could be made most perfect. There were only three gentlemen who had spoken against all patent laws, and, without meaning any disrespect to those gentlemen, he must say a greater mass of fallacy or ignorance upon any subject had never been propounded by men of science. He might use strong language, but he was sure they would forgive him. Mr. Denison had referred them to the question of soke mills; but what could the practice of feudal times have to do with the patent laws? Mr. Denison referred to what he called "incorporeal property," as contrasted with property in land, the funds, &c. But he (Mr. Webster) would like to know what could be more incorporeal than property in the funds? Now, he maintained that a man had as much right to a patent in the results of his labour as an author would to a copyright in his books. Mr. Denison had referred to Milton's "Paradise Lost," and said it was not probable that anyone else would have written it. But "if anybody believed that somebody might have written Milton's 'Paradise Lost,' why let him believe it." Now, could there be a more unsatisfactory mode of dealing with

a serious subject than this? Mr. Denison also said that a copyright was no obstruction, because all that a man was prevented doing was copying the works of another. That was all the patent laws prevented a man from doing. He held in his hand a work called "The Clockmaker," by Mr. Denison himself, in which he stated that it was compiled, believing it would be useful, as no similar work existed. Yet, though it was a mere compilation, Mr. Denison had a copyright, and another person could not publish it. Mr. Denison had stated that Newton, Leibnitz and other eminent men, had not been able to obtain patents, because their discoveries were only carrying out the laws of nature. No one pretended that the laws of nature could be patented, but the ideas founded on, and the applications of, those laws might be. Milton's "Paradise Lost" was not new so far as the idea was concerned, but it was so in the expression and carrying out of that idea. Allusion had been made to the fact that, in the inquiry before the Committee of the House of Commons, in 1829, not one person had given evidence against the patent laws; whilst before the Committee of 1851, six persons had expressed their opinion that they ought to be abolished. However, they must recollect that Lord Granville, who had a strong opinion against these laws, admitted that they had obtained all the evidence they could against the laws. They had heard of converts, and they had heard of perverts, and it appeared that Mr. Winkworth, who was for the abolition of the law, was himself a convert, he having formerly taken part in the proceedings of that Society, relative to the improvement of these laws. There had no doubt been great injustice done through these laws from the enormous amount of expenses in obtaining patents, but that had now been remedied; and he had no doubt that all the other abuses now existing might also be removed by calling the attention of the public and the legislature to them.

The CHAIRMAN did not pretend to give any opinion either for or against the patent laws, and probably he was not well qualified to do so; but he must be allowed to say that he considered the opponents of those laws had been somewhat harshly dealt with in the discussions, in being accused of ignorance, and dealing in nothing but fallacies. It appeared to him that the other side had equally dealt in fallacies, and that Mr. Cole's illustration of two men chasing the hare, and the one killing it being entitled to it as property, was not at all analogous to the patent laws, for then it was a question of two hares in two fields, and upon one man finding the hare and taking it to the Patent Office he was told that somebody had been there before him, and that, therefore, he could have no property in hares for the future, even though he might have been the first man to catch the hare, though not the first to take it to the office. He did not think the eighth commandment at all bore on the question of public expediency, or what would be best for the general interests of society. He thought, too, that the statements made that not one invention in a hundred paid the inventors, was a strong ground for believing that the patent laws did not always prove of advantage. He had now only to move a vote of thanks to Mr. Webster for his very able paper.

The Chairman announced that at the meeting on Wednesday next, the 8th inst., a Discussion would be invited, "On the Defects in the Administration of the present Patent Law."

EDUCATIONAL APPARATUS EXHIBITION.

The following letter has been addressed to the Right Honourable the Earl of Clarendon, Her Majesty's Principal Secretary of State for Foreign Affairs, and to His Grace the Duke of Newcastle, Her Majesty's Principal Secretary of State for the Colonies:—

Society of Arts, Manufactures and Commerce,
Adelphi, London, 27th January, 1854.

MY LORD, [DUKE,]

I am directed by the Council of the Society of Arts to request your Lordship's [Grace's] assistance in a measure of great public importance.

The Society of Arts has always aimed at the promotion of Education; and rendered some services in this cause before the Educational Societies now flourishing were in existence.

Being now in its One Hundredth Session, the Society is desirous that the celebration of this event should be marked by some prominent measures, indicating its settled conviction that it is to an improved Education of all classes that the nation must principally look for an improved condition of its Arts, Manufactures, and Commerce.

In May, 1852, under the presidency of the Marquis of Lansdowne, K.G., it was resolved, on the motion of Earl Granville, that the Society should offer to receive into union the Literary and Scientific Institutions, Philosophical Societies, Athenæums and Mechanics' Institutes, which are established in all parts of the United Kingdom. Three hundred and thirty-five of these bodies have already been taken into the union; and, at the Conference of their Representatives, in June last, the Council was particularly invited, and undertook, to hold an Educational Exhibition, at the opening of the next Conference, in the month of June of the present year.

It was considered that such an Exhibition, got up on a large and complete scale, and well arranged, would have a powerful effect in improving the means of Education, and in raising the public ideas respecting it.

At the instance, and with the aid, of this Society, the Lord Mayor of London, last year, held a small Exhibition of Educational Apparatus at the Mansion House. This Exhibition excited a very lively interest; but was not more than sufficient to show the great importance of the subject thus attempted to be illustrated, and its backward condition in this country.

The Council of the Society of Arts is desirous that its Exhibition, in June next, should be complete, and thoroughly practical and instructive; and it is regarded as most important to exhibit, as far as possible, to the people of this country a representation of the state of Education in France, Prussia, Holland, Sweden, Denmark, Switzerland, and the United States of America, [in certain foreign countries and colonies,] as well as in the United Kingdom.

The Council is convinced that it would be of great service and interest to exhibit a model of such a School of Primary Instruction as would be approved by the Departments of Public Instruction in France, Prussia, Holland, Switzerland, Denmark, Sweden, and at Washington, New York, or Massachusetts, [in Canada]. In addition to this Model of a Primary School, it would be most important that there should be a Specimen of every article which is authorised to be used in the different classes of the Schools recognised by the State, whether these be primary or secondary; including Books, Maps, Diagrams, Apparatus, Copies and Models for Drawing, Pens, Pencils, &c. Nothing that is officially authorised to be used, or is commonly used, in such a School, would be too trifling to be of interest in such an Exhibition. Specimens of average merit of the writing, drawing, needlework, printed examination papers, and any other work, done in the Schools would be very acceptable. It would of course be desirable to classify such collections, so as to show whether they apply to Primary Schools, or to Secondary Schools; embracing a course of general Education or of instruction specially applied to Trades and Manufactures.

The Models of the School Buildings, including their

fittings and fixtures, should be constructed to an uniform scale of one in ten.

The packages should be in London by the end of May.

The Council cannot but believe that a design so important would commend itself to the judgment and feelings of the Ministers of Public Instruction in the before-named countries [of the Governor of Canada]; and that your Lordship, [Grace,] seeing how great a service might thus be rendered to the cause of public Education in this country, would be pleased to make known these objects [this object] to Her Majesty's Ministers at Paris, Berlin, the Hague, Copenhagen, Stockholm, Berne, and Washington, [to His Excellency,] in the hope that they [he] may be pleased to promote their accomplishment [it].

I am to add that, if your Lordship [Grace] would be so kind as to procure, for this Society, through Her Majesty's Minister or Consul, in each of those countries where a Code of Public Instruction exists, a copy of that Code [for this Society, a copy of the Codes of Public Instruction in force in each of the Colonies], together with as many as possible of the detailed regulations, including the "Time Tables," of the several Schools, the Society would be glad to publish, at the time of the Exhibition, an English synopsis of the whole; and it could not fail to have a very valuable influence among the more enlightened members of the numerous public bodies that promote public Education in this country.

I have the honour to be,
My Lord, [Duke,]
Your Lordship's [Grace's] most obedient humble servant,
(Signed) P. Le Neve Foster,
Secretary.

EDINBURGH CHAMBER OF COMMERCE AND MANUFACTURES.

The annual report of the proceedings of this Chamber during the past twelve months, shows that its attention has been particularly directed to twenty-three topics of public interest, besides many other matters of minor or lesser importance. As might be anticipated, proposed improvements in the law, especially of the law of bankruptcy, of Lord Brougham's bankruptcy bill, and of the means of improving and assimilating the mercantile laws of the United Kingdom, have occupied a large share of the time of the Chamber. In regard to the latter object it would appear that the Chamber has made representations to the Lord Chancellor, as to the composition of the Royal Commission, which was appointed to inquire into the subject last year, and has expressed its belief that any report issuing from the Commission as at present constituted, would not be received by the mercantile interests of Scotland, as unprejudiced or satisfactory. So far as was known the only step of importance yet taken by the Commission, had been to issue a set of queries upon the law of partnership, particularly with a view to the limited responsibility of partners, even in private trading companies. As to the question of Colonial Postage, the report alludes to the deputation to the Earl of Aberdeen last session, and to his refusal to comply with the wishes of the requisitionists; and that the subject has now, it is said, been placed in the hands of a Treasury Commission for examination. In regard to the Patent Laws the report says "In the improvement of the laws regulating the granting of patents for the United Kingdom, the Chamber has taken a deep interest. During the passing of the Bill for that purpose, it appeared to the Chamber that the interests of Scotland were overlooked, and a petition was accordingly presented to Parliament, pointing out those particulars which they wished amended in the Bill, and they had the satisfaction of obtaining what they sought. But the provisions thus obtained in regard to sending true copies of all Patents and Specifications to the office in Edinburgh, there to form Records for inspection and evidence for the convenience of the people in Scotland, never were complied with. This was regarded as too troublesome and expensive, and a Bill was actually introduced into Parliament to repeal them, and to furnish imperfect documents and information instead thereof. The Chamber immediately took steps to prevent the infliction of what they regarded as a wanton outrage on the country, the violation of a settled compact. A Petition was presented against the Bill, and communications made to various public bodies, calling their attention to the subjects, and in a subsequent Petition a proposal was suggested by which the object might be accomplished with but very little trouble or expense. It was proposed that each Patentee should, on filing his claim, give in THREE COPIES of all the specifications and drawings he required to lodge; thus two copies would be to spare, one of which might be sent to Edinburgh and the other to Dublin, so that both countries might have been supplied at no other expense than the carriage of the documents. This simple expedient commended itself so much, that at first it was ageeed to; but it was soon regarded as too great a boon and rejected, and various schemes fallen upon to defeat the object. But at length, in consequence of the Representations not only of the Chamber, but of the Town-Council, Merchant Company, and other public bodies, particularly the convention of Royal Burghs (to whose able and intelligent agent, Mr. J. W. Mackenzie, the country owes a deep debt of gratitude on this occasion), supported as they were by the Duke of Buccleuch, the Earl of Eglinton, and other patriotic noblemen, the members for the city, and other influential members of the Lower House, and also by the Irish members, these schemes were defeated; and although the simple, inexpensive plan of the Chamber, whereby *originals* would have been lodged both at Edinburgh and Dublin, was refused, another was adopted by which *copies* are transmitted within about three weeks of their being filed, and these copies are accompanied by copies of all the drawings, &c., originally given in. A large hiatus yet remains, several hundreds being still awanting for that period of about nine months, during which the provisions of the first Act were not complied with. These yet remain to be supplied, although the Act required them to be sent 'forthwith'; and in consequence, the Record cannot be made at once so useful and beneficial to the public as it ought to be. This may, perhaps, demand the further attention of the Chamber."

The present state of the Trigonometrical Survey in Scotland is considered highly satisfactory. The general scale adopted is that of six inches to the mile. Towns which exceed 4000 inhabitants are laid down to a scale of five feet to an inch; those under that amount to two feet to a mile. An investigation into the geological structure and mineral wealth of Scotland is, it is said, about to be commenced, under the direction of Sir Henry De la Beche and Professor Ramsay; and this, it is hoped, would lead to the establishment of a Museum of Economic Geology in Edinburgh. The Admiralty Surveys of the principal ports are likewise in an advanced state. The subject of meteorological observations at sea has also received attention, and "a committee was appointed by the Chamber to consider and report on a plan proposed by the American government for the registering and collating, by a general plan of observations, among the principal commercial nations, the direction of the winds and currents of the ocean." The Committee postponed meeting, in consequence of the Brussels Conference. "The importance of having correct wind and current charts is fully appreciated by the mercantile world, and is too obvious to require comment. A second conference, it is understood, is now about to be held by representatives from the principal governments in Europe and America, for the purpose of combining the observations taken on land with those taken at sea, with the view of rendering those charts more perfect, as also for more fully elucidating the laws which govern atmospheric phenomena, and their influence upon the seasons and the products of the earth." The subject

of Decimal Coinage, "which was remitted to a committee of the Chamber for consideration, was reported upon by that committee; and that report, which proceeded from the pen of Charles Lawson, Esq., of Borthwick, its convener, having been considered by the Chamber, was, on 18th April last, unanimously approved, adopted, and ordered to be transmitted to her Majesty's government, recommends—1st. That the existing *sovereign* or pound shall be the unit or integer of account. 2nd. That the *florin* (already existing) represent the tenth part of the unit or pound; and 3rd. That a coin representing the 1000th part of a pound, or the 100th part of a florin, to be called a *millet*, be also issued. These three coins to form the money of account, in which all numerical computation will be simple and easy, and capable of being worked out by the common rules of arithmetic. Besides these, the report recommends, for the convenience of the public, that half-sovereigns, half-florins, a 20 millet piece, a 10, a 5, and a half-millet piece, should also be issued."

ANALYSES OF RAW MATERIALS USED IN CALICO PRINTING IN INDIA.

In a recent number of this Journal, No. 55, page 56, a description was given of the cotton printing process of Tattah, by Lieutenant C. J. Steuart, and it was stated that a number of rudely cut blocks, the tools with which they were cut, and the calicoes as printed from these blocks, in different styles of the process, as well as the various dying materials alluded to, had been forwarded by the court of directors of the East India Company to the Manchester Commercial Association. The dying materials were four in number, and consisted of a reddish earth called "meth," and three tanning substances bearing the names of *sakoon*, *huleleh*, and *hoongootarah*, used in printing madder goods, as Aleppo galls are used in this country by Turkey red dyers. These substances are all vegetable, viz. the gall of the *Tamarisk Indica*, the flower of the Tamarisk, and the kernel and pericarp of the fruit of the *Terminalia Belerica*. They were placed in the hands of Professor Crace Calvert, for careful analysis, having reference to their utility in this country, in calico printing, and he has made a report to the Manchester Commercial Association, from which the following is extracted:—

"The red meth, which, according to Mr. C. J. Steuart's most interesting report, is used in Sindh by the calico printers for thickening their colours, and also for mixing with alum, is a substance admirably suited for these purposes, as it presents the curious property, when moistened with a small quantity of water, of crumbling into powder in a similar manner to quicklime, and thus enabling it to form with water an homogeneous paste. The alumina which this clay contains enables it, when mixed with alum, to remove a part of its sulphuric acid, thus producing a basic alum, which replaces in the hand of the Sindh calico printer the red mordant or aceto-sulphate of alumina used in England. The analysis of the meth gives an insight into the modification which the earth called 'mooltanee muttee" (which exists so abundantly in Sindh) proabably undergoes to give rise to its formation; for if the clay be treated with weak hydro-chloric acid, the peroxide of iron, the alumina and combined silica are removed, leaving as a residuum some white anhydrous silica. These facts induce me to believe that the 'mooltanee muttee' earth is a double silicate of alumina and protoxide of iron, which latter substance, under the influence of the atmosphere, becomes peroxidised, liberating the silica which is found free in the meth. As to the excess of silica still remaining, I cannot well form a correct opinion as to its source of production, not having at my disposal any of the earth called 'mooltanee muttee.' The great proportion of chloride of sodium which exists in meth deserves serious consideration, as it is probable that near the locality from whence the sample of clay was obtained beds of common salt exist.

"ANALYSIS OF METH.

Silica	69.30
Alumina	6·34
Peroxide of iron	7·28
Protoxide of iron	·24
Chlorides of sodium and potassium	3·40
Organic matter	3·20
Water	10·00
Loss	·24
Total	100.00

I shall now draw attention to the three varieties of tanning substances which you have placed in my hands, and which, according to Mr. Steuart's report, are employed in Sindh for printing madder goods, for the same purpose that Aleppo galls are used in this country by Turkey red dyers. As some of these substances may prove of value to the manufacturing districts, I thought it would be desirable to determine the amount of tanning matters which they contained:—

	Sakoon.	Flower of the Tamarisk.	Pericarp of the Huleleh, fruit of the Terminalia Belerica.	Kernels of the fruit of the Terminalia Belerica.
Tannin	51·8	30·25	52·00	6·0
Woody fibre, &c.	36·2	56·5	35·25	81·25
Water	12·0	13·25	12·75	12·75
Total	100	100	100	100

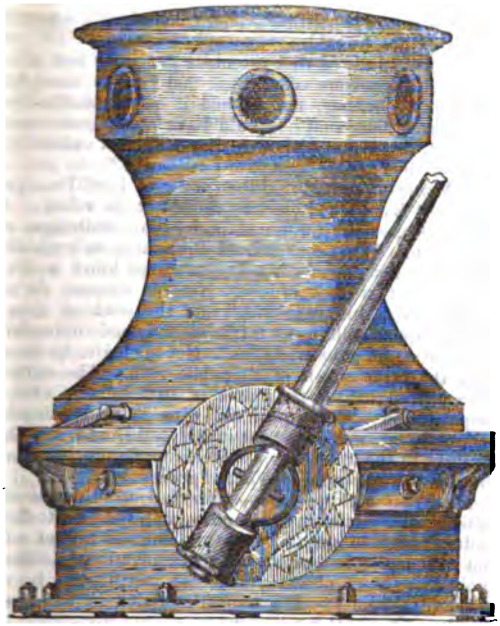
Two of these substances, viz. sakoon and hulelch, containing as they do nearly as great a proportion of tanning matter as Aleppo galls, could, if imported in larger quantities and at a low rate, be employed with advantage by the tanners of this country. With respect to the application of these three tanning matters in dyeing, I wish to draw especial attention to two of them; firstly,—sakoon, which substance has lately been imported by Mr. Pariente of this city, under the name of Bockhara galls; and although it contains so great a proportion of tannic acid, still it is free or nearly so from gallic acid, consequently it gives a beautiful jet black, superior to that produced by Aleppo galls, with iron mordant of an identical strength. It also produces with alumina superior olives and yellows. Secondly,—Koongootarah, or Tamarisk flowers. These flowers are highly interesting, as they give, with iron and alumina mordants, or a mixture of the two, several useful and distinct colours. For example—I have, with an iron mordant, obtained a black superior to any that could be produced from other substances; with alumina a fine yellow, and with a mixture of the two mordants, very superior shades of olive. As to huleleh, it does not appear that it can be advantageously applied in dyeing, on account of its containing, besides tannin, a brownish yellow colouring principle, which not only gives to the blacks a brown greenish hue, but also spoils the alumina colours and dirties the white. I forward with this report some samples of calico dyed at the same temperature and with the same weight of each tanning substance as compared with the best Aleppo galls."

CONSUMPTION OF SMOKE.

The principle adopted by Messrs. James Hume and Co., at the Haymarket Flour-mills, Edinburgh, is that of obtaining more perfect combustion of the smoke, by exposing it to an extensive heated surface, and by the admission behind this heated surface of fresh unconsumed air which causes its ignition. It is applied to a double-furnace Cornish boiler of an engine of 90 horse power, and the coals used are all Scotch, and consist of one-third dross and two-thirds mixed coal. At the further end of each furnace the space between the level of the bars and the roof of the flue is divided into eight spaces by seven bricks, each 3 feet 6 inches long, 4 inches thick at the bottom

and ¼ of an inch thick at the top; and reaching to the under side of the boiler, so that they vary in depth or height, with the radius of the boiler flue, from 14 inches in the centre to 6 inches at the sides. From their position at the end of the furnace these bricks soon attain, and preserve, a white and red heat, and separate the smoke which must pass through them to the flue. The fresh air is admitted at the further end of the ash pit, immediately under the furnace, by an air valve, 15 inches by 5 inches, which is very simply and readily worked by a rod under the bars, terminating with a handle just under the furnace door. Should the draft admit of it, the air valve can remain open, or it may be opened only when coaling. The apparatus has been in constant use for the last six months, and continues to give entire satisfaction.

PERLEY'S PATENT CAPSTAN.



The improved capstan, of which the above cut represents a general view, has been for some time in very extensive use in the United States of America, but has only recently been introduced into this country.

The action is extremely simple, and is rendered sufficiently clear by the above cut, without a detailed description of its construction. The various parts are so arranged as to cause a small amount of friction, not to present any difficulties whatever in practice, and to prevent any injury which might arise from water gathering to the working parts.

The inconveniences of the old form of capstans are too well known to require enumeration. Perley's patent capstan, instead of requiring a large space for the men to "walk" round it, may be placed in any convenient corner. It takes little more room than a ship's-pump. It is, in fact, a powerful and very convenient vertical windlass, worked by pump handle levers, a more effective mode, as any mechanic knows, than the horizontal working of the common capstan.

The capstan may be worked in either direction, by merely reversing the rachets, and, if required, by the old mode of horizontal levers.

It is said, that during the last three years, 475 of these capstans, being about one for every two days, have been sold in the United States, and almost all the vessels sailing from New York to London have one or more of them on board.

Certificates signed by the United States navy constructor at Brooklyn, by several eminent ship-builders of New York, Boston, and Portsmouth (U.S.), and by the captains of several well-known vessels, speak in high terms of this capstan, as enabling the men to exert their power to better advantage than any other with which they are acquainted.

DIPPING AND APPARENT LIGHTS.

At the meeting of the Royal Scottish Society of Arts on Monday January 23, a Paper on "Dipping and Apparent Lights for sunk reefs and pier-heads of harbours, with descriptions of an Apparent Light erected in 1851 by the Commissioners of Northern Lighthouses, on a sunk rock in the Bay of Stornoway" was read by Mr. Thomas Stevenson. The author described the plan of dipping lights as being applicable to cases where the rocks or shoals whose position required to be indicated were surrounded with sufficient sea-room to enable vessels to pass to and fro without approaching near to the rocks themselves. The dipping light, instead of throwing its beam of parallel rays to the horizon, in the same manner as ordinary lights, throws it downward at some given angle of depression to suit the distance of the rocks from the shore, so that, whenever a vessel crosses the margin of safety, the dipping light is seen, and she has ample time to change her course. The apparent light is useful for sunk rocks in narrow sounds, where the fairway is not broad, and where the dangers must be passed very closely; also for pierheads at the mouths of artificial harbours, and such like situations. The apparent light at the entrance to Stornoway Bay, in the Hebrides, is erected on a sunk rock distant about 630 feet from the lighthouse on the shore, and consits of a hermetically sealed lantern containing certain forms of optical apparatus, upon which a beam of light is thrown from the lighthouse ashore. The effect of this apparatus is to reassemble the rays in a focus, from which they again diverge, presenting to vessels entering the bay the appearance of a real light on the beacon, when, in fact, there is none. The apparatus necessary for illuminating floating buoys on the same principal was also explained, and the paper was concluded with extracts from letters from ten different shipmasters, who certified to the utility of the beacon light *in all weathers*. The distances to which it had been seen varied from *one to one and a half* miles—distances greatly beyond the wants of the locality.

METEOROLOGY OF THE PAST QUARTER.

At the last meeting of the British Meteorological Society, Mr. J. Glaisher, F.R.S., read a paper "On the Meteorology of the past Quarter, in connection with the Fall of Snow at the beginning of the Year."

After acknowledging his obligations to those gentlemen who had contributed observations, Mr. Glaisher proceeded to discuss, separately, each element of investigation. The mean daily temperature of the air was shown to have departed most below its average between lat. 51° and 53°. This head of country was subjected to a continuance of low temperature for the long period of two months, and was likewise remarkable for the prevalence of dense fogs, which were of almost daily occurrence during November, at times nearly enveloping the whole country. The rigorous weather which ushered in the present year, was most severely felt over the midland counties, where the reading of the thermometer was as low as zero. In London and its vicinity, it fell to. 13°, 12°, 11°, and 10°. on the morning of the 3rd, and it was at the time of these low readings that the heavy fall of snow took place. The average amount of snow upon the level about London was twelve inches, and averaged deeper between latitude 51° and 53° than elsewhere. On

the Norfolk coast it was 18 inches deep, but at Whitehaven scarcely an inch fell, and in parts of Northumberland none at all. Parts of Cornwall were exempt, and there was little at the Isle of Wight. At the Isle of Man it fell to the depth of eight inches, and drifted to about ten feet. The greatest drifts recorded were about 15 feet. In connection with the cold, as falling beneath his own observation, Mr. Glaisher remarked that trees in his immediate neighbourhood, Blackheath, were sheathed with ice for some days previous to January 4, when it began to break and fall to the ground in fragments bearing the curvature of the branches they had encased. On the severity of the weather mitigating, the ground was literally strewn with these fragments. Animals ordinarily exposed on the adjacent heath perished from the cold, and two were frozen to death beneath the snow; birds frozen dead from the trees were picked up in the vicinity of the author's house. Mr. Glaisher addressed the meeting at some length upon the chrystalised flakes mingled with the snow which fell during the very severe period at the beginning of the year, and produced for distribution a number of photographic copies of such as had fallen beneath his own observation. As specimens of an entirely novel application of photography to the purpose of meterology they were well received. In conclusion Mr. Glaisher detailed at some length various observations made by himself upon the beautiful encrustations seen in hoar-frost upon differently exposed and radiating surfaces.

Home Correspondence.

REMARKS ON THE DISCUSSION ON PATENTS.

SIR,—I have striven hard to discover some logic in Mr. Denison's reply to Mr. Webster's paper, and find only the truth of the proverb "Of nothing, nothing comes." Mr. Denison professes to be a practical man, and eschews philosophy and metaphysics altogether in a question of patents. He rests his argument almost entirely on authority, a defective peculiarity of the lawyer mind, incessantly quoting precedent. He remarked,

"What was property? Property in the funds, houses, lands, &c., was acquired by getting hold of that which formerly belonged to some one else."

This is a strange proposition, but, to be effective, it becomes essential to assume that there never was a period of land withou townership, otherwise the link fails. Trace up the parchments till we come to our first parent in the male line, with his deed of gift of the whole world from the Creator, or there will be a lache! It will be a bad title. But Mr. Denison means, probably, that "getting hold" no matter how, of something that belongs to another, settles the question. If so, the argument cuts two ways If the patentee can "get hold" of something that formerly belonged to another, he has an equal right. The present incomer in the exclusive land pays his money for possession for ever, and the patent incomer on the exclusive manufacture pays his money to the general public, and also his money's worth, for possession for fourteen years. It is most unwise in men of "real property" to set up this argument, for they will be required to show what return they give to the public for their claims for rent, on land, and *royalties* (so runs the word), on coal, iron, and other minerals. They do nothing for the public, they scheme nothing, plan nothing, devise nothing, work at nothing, encounter no man's scoffs', heed no capitalists opposition. They simply block the passage and demand black mail, the amount of which is regulated only by the competition of the royalty holders. For patent royalties a *quid pro qui* is given.

Mr. Denison says "the patent laws give to mankind a right, which, without them they would not have."

Does he really mean this—mankind?—If given to mankind—which is really the case, inasmuch as they benefit all mankind—mankind do not suffer. But probably he does not mean mankind but only "the patent people, and patent men, and patent persons," whom he superciliously scoffs at under his retaining brief in the land interest. Well, then, let us vary the venue, and read—

"The real property laws give to mankind a right, which, without them, they would not have; *i.e.*, to landed people, mine men, and similar persons."

I do not find the phrase "patent person" in the report, but a hearer reported it to me verbally. I would, therefore, remind Mr. Denison that the "person" derived from the *per sono* of the old dramatic masks of actors with a tube in the mouth—whence *dramatis personæ*—would apply better to a pleader at the bar than to a patentee. The pleader is the *person*, the "by-sound," the dramatic actor, paid for his vocabulary of words. The patentee is but a worker, urged into voice of remonstrance by the class injustice that would monopolise all materials on which mind has to work, and make "free warren" of ideas.

Mr. Denison is peculiarly unfortunate in his quotations of authorities, he said—

"It was admitted that patentees generally lost money, although there were some great and famous exceptions. Watt made money, but he had it on the authority of Lord Brougham, that he would have made more money without his patents, although they had been extended to him for thirty years by Act of Parliament."

If Mr. Denison had said the *opinion* of Lord Brougham it might have stood *quantum valeat*—at its value. But when he uses the term "authority," he challenges contradiction. What makes Lord Brougham an authority? Certainly not *law*, for Mr. Denison must know well that lawyers scoff at his *legal* lore. Not his science, for men of depth call him "sciolist," and the working men in Southampton-buildings, "turned to" and demolished his treatise on "hydrostatics." Not his logic, for he was ever the most erratic of all public men. The value of Henry Brougham to the public is, that he was ever an impulsive advocate for progress, with generous emotion, whose heart was better than his head, and kept him straight in the main, in spite of his numerous crotchets. But for this he would be *Vaux et preteria nihil*.

Mr. Watt could probably well afford to dispense with patents after attaining fame and capital, but how to find a Bolton to enable him to attain this fame and capital without a monopoly to tempt him, would have been a difficult problem. As an obscure maker of instruments he was only a "schemer"—as a known capitalist he was recognized as a national benefactor.

To return to Lord Brougham. Many years back a certain Reverend Mr. Hardy devised an improved method of making axles for carriages and shafts for mill-work, and procured a patent for it. A company was got up to work it, and it dragged on a precarious existence for a few years, when the whole concern fell into the hands of two or three persons, patentee and friend all disappearing from the scene. The business then became a flourishing one. But in due time the patent expired, or was about to expire, so the owners of the business sought out the unfortunate patentee, and agreed to give him £300 per annum for his aid in getting them a renewal of the patent. There was the usual statement of loss, which Lord Brougham overhauled and dissected with some acumen, and finally only granted the seven years' renewal on consideration that the patentee of the improvement should receive £700 per annum instead of the £300 offered.

It is clear, therefore, that Lord Brougham thought the patentee a useful and meritorious individual. And it is also clear that but for the patent there would have been no company. The patent monopoly was the basis on which people took shares.

Mr. Denison says,—

"Sir W. Cubitt opposed the patent laws, and so did Mr. Brunel—no mean authority."

This is sheer absurdity—a special pleading. Show us

that either of them possess the mental capacity of legislators, or it amounts to nothing—worse than nothing—if it can be shown that the rise of the patentee has a tendency to lessen the *prestige* of the engineer—positive evidence in favour of the patent laws, if it could be shown that the engineer was a jealous and ungenerous man, anxious to keep down rising merit, and arrogate all originality to himself.

The evidence of Mr. Ricardo, that the Electric Telegraph Company buy up patents, is a proof that the patents interfere with monopolies. But for new patents the electric telegraph would have remained a giant monopoly—the monopoly of capitalists for an unlimited period; for no individual would have worked at improvements that the company could instantly have taken, when perfected; and it is only *individuals* who perform the originating work. Oersted's discovery would have remained as a scientific fact, had not Cooke and Wheatstone been stimulated by the proposed patent advantage. Mr. Ricardo may well dislike patents, for his company has spent much money in trying to hedge in the patent-cuckoo unsuccessfully, and beholds other companies as successful as his own, with less outlay, upon new patents.

The truth is, that all capitalists like monopolies, and wish to obtain them by many other means than patents, and they do not like patents, because they are not practical monopolies, but only monopolies in aid of skill and originality, but liable eventually to be tripped up by newer patents, unless the originating brain be constantly on the watch. The capitalist does not like the constant fret; he wants to be easy, and acquire a funded property, with a sure and certain ten per cent. return. But for originators, existing things would be undisturbed, and existing capital in ships, buildings, and machinery, a permanent quantity But for patents there would be few originators; and therefore it is easy to comprehend that capitalists invested cannot look lovingly on disturbers. The mere capitalist is ever gravitating--the inventor is incessantly elastic.

If the capitalists were canvassed, it would probably be found that those in favour of patents would be those profiting by them, and the opponents those not possessing them, and sore displeased with their neighbours' stealing a march upon them.

If Mr. Denison cites Mr. Ricardo as witness, it must not be on the subject of patents, in which he is interested. If Sir William Cubitt, it may be as an engineer, but not as a legislator; if Mr. Brunel, no man can be more at home as to the most telling mode of giving evidence for or against a railway, or how to escape an admission; but to set him especially up as an authority on patents, when he has declared his maximum price to an inventor to be 2*l.* to 5*l.* per invention, to merge into the name and reputation of the capitalist or engineer is begging the question in too barefaced a manner. We will receive Professor Airy as an authority on astronomy, De la Beche for sound doctrine on geology, and Faraday as a chemist—though certainly not as a propounder of patent law—if it be true that he invented gaslight improvements, and allowed his brother to patent them surreptitiously. We would not object to the authority of Ikey Solomons on the subject of stolen goods, and we can receive Mr. Denison himself as an expounder of the principle of special pleading. Whether this special-pleading faculty is of any benefit to the nation at large in a moral point of view is one question, but assuredly it is not the faculty to which a nation can entrust the power of passing laws of progress.

One more sentence. Mr. Denison says,—

"They could not have manufactures in secret; or, if they could do so, he would tell any man that it was better than a patent, because, by secrecy, they would avoid litigation, while with the patent laws they were sure of nothing but litigation."

It is quite clear that so long as the power of legislation is entrusted to lawyers, laws will be framed in the very best mode to ensure that litigation by which the lawyers live. If the lawyer's gain were made to depend on the absence of litigation, *i.e.*, if they gained more by the absence than by the reverse, as it is said the state physician of China only receives his salary while the Emperor is in health, a very different result would obtain.

Mr. Denison lays great stress on the opinions of Lord Granville and Mr. Scott Russell, the more especially as "the latter was an inventor." Will he be good enough to state what Mr. Russell has invented and brought into successful use?

There is one sentence of Mr. Denison's quite conclusive, as to the advantage of patents to the public, and the absence of disadvantage:

"The opinion given by that jury of the Great Exhibition, of which Sir David Brewster was Chairman," was, "that a greater portion of the goods exhibited in their section had been made to avoid patents."

That is, the patents stimulated further improvements, which rendered the patents valueless. What more could the public desire?—further

"The improvements in photography had been merely owing to the original patents having failed, and to Mr. Fox Talbot on being requested by a committee to give up his patents, because they were an obstacle to improvement having done so."

And if Mr. Fox Talbot had not taken the patents, the chances are that photography would have lain longer in abeyance. His liberality only lessened the interval to their improved use. Without his liberality the public would have waited a little longer, yet still not so long as if he had not invented at all.

Waiting the further report of the discussion,

I am, Sir, yours, &c.,

COSMOS.

January 28, 1854.

INSTITUTIONAL PERIODICAL.

Sir,—Allow me, through the medium of your journal, to address a few propositions to the members of literary and other institutions, in an endeavour to point out to them how desirable it would be to have a paper which shall more closely unite them than they are at present. This being an age of progress—a period which has become a new starting point in the era of literature and science—it is, I conceive, the duty of every person to contribute, much or little, to the general fund of knowledge, for the benefit of his fellow-men.

I propose that a paper be issued monthly, containing some original articles from members of the several institutions in union. This will be the means of discovering talent, for I have always observed, that unless there is some incentive, many are unwilling to place their crude ideas into a readable form, but if they find there is a probability and method of being useful, they will endeavour to write upon some subject. That each secretary furnish a report critique upon the lectures delivered during the month, the report to be an outline of the subject. This will give a great insight into various sciences. The plans of management adopted by two institutions from their foundation, and the success they have met with, should be given each month, to afford a large fund for the observations of committees, to guide them in their future regulations, and also the monthly operations of each society. Reviews of books and new inventions might also be given. Learned bodies would, I have no doubt, contribute, and thus a paper might be formed of great usefulness not only to institutions, but to private individuals. The expense of printing could be defrayed by subscription, and could be published at the office of the *Journal*, where the editor could reside. The price should not be more than 5d. stamped.

With a hope that these suggestions will meet with the support of the institutions, I am, Sir, yours very faithfully,

GEORGE SPIERS.

High-street, Croydon, 26th January, 1854.

PETTITT'S FISHERIES GUANO.

SIR,—On reading the discussion upon the above paper, in the Journal of the Society of the 23d ult., I was rather surprised to notice that Mr. Pettitt is reported to have said, "In reference to what had been stated by Mr. Campbell, that Turnbull, of Glasgow, was the originator of this guano, he having, years ago, boiled up dead horses in muriatic acid, and sold the produce as manure, he might observe that the real nature of Turnbull's manufacture was the production of the cyanides from the nitrogen contained in the animal matter for the manufacture of his celebrated blue, the residuum only being sold for manure. This residuum would be totally devoid of ammonia, and would, in fact, only be a mixture of the phosphate of lime (from the bones of the animal), and inert organic matter, or animal carbon. This being the fact, no claim could be maintained to the discovery of fish, or even animal guano, of any kind by, Mr. Turnbull, indeed there was no analogy between the two manufactures," for it was the impression of myself, and I may also add, of one or two chemical gentlemen sitting near me at the time, that no direct contradiction, such as the above, had been given by Mr. Pettitt to the statement which I made, and which may be condensed as follows:—That many years ago, I think as many as ten, Messrs. Turnbull, of Glasgow, had manufactured ammoniacal salts, and also manures, by the action of muriatic acid and likewise sulphuric acid, with heat, upon the carcases of dead animals, such as horses; and, that, therefore, this could not be Mr. Pettitt's invention, although claimed by him in his specification of a patent granted to him so late as last year.

Mr. Pettitt addressed the meeting in a very low tone of voice, and from where I sat, which was some distance behind him, I had great difficulty in catching what he said; but, however, had I heard his reply, I could only have reiterated at that time what I had stated before, whereas now I am furnished with the best proofs of how correct I was in what I advanced, as the following letter from the senior partner of the firm of Messrs. Turnbull will show. It is a reply to a letter from me requesting for any information upon the matter:—

"Bonhill House, 25th January, 1854.

"DEAR SIR,—I am in receipt of your favour of the 19th, and feel obliged to you for claiming for our house the priority of those ammoniacal manures that seem to be now-a-days the subject of so many patents. The more that can be produced the better for the country, and I wish them all manner of success.

"The first that we applied ourselves to, and I think the best, was the salts from the human urine—the urine was saturated with sulphuric acid, and converted into a fine powder. We began this about the year 1833. Our next was night soil combined with ground wood charcoal and gypsum. Of the two latter substances, our pyroligneous works furnished an abundant supply, the gypsum arising from the decomposition of acetate of lime and sulphate of alumina. Then, in 1812, we took to buying bones, dead horses, and other animals, which we dissolved in muriatic acid, and dried up into a powder. Sulphuric was again substituted for the muriatic acid, as giving agriculturally the best result. We even operated upon the bones of the whale, which, as far as I recollect, contained about as much phosphate of lime as the others; for some years past it was done without acid—the flesh was dried at a low heat, and finally ground, and the bones in the same way. These were sold separate.

"We found ways of getting rid of the nuisance of the thing pretty well; but lately a firm set up in our neighbourhood, creating a good deal of smell, which we feared to get the credit of, and gave up the manufacture altogether, and the police put the other down.

"I was sorry to give it up, for at this time such products are much wanted. We have always carried on this branch, in a great measure, for the benefit of our own farm, which has been a sort of hobby with us.

"In the manufacture of the cyanides it was only horns and hoofs that were employed, and I may remark that we never thought any of those patents could be protected—indeed, we never considered those processes patentable, the getting ammonia from all such substances being so well known to the old chemists, and in agriculture animal substances, wholly or partially decomposed, have been always more or less resorted to.

"I am, dear Sir, yours respectfully,

"JOHN TURNBULL.

"When your letter came I was absent, which is my apology for being so long in writing to you.

"Dugald Campbell, Esq."

The manufacture of artificial manures, is every day becoming of more and more importance, and aware that the Messrs. Turnbull, of Glasgow, had bestowed their experience and skill upon processes of this nature for a number of years back, I was sure that, if a communication was received from this source, it would prove highly valuable and interesting. Under these circumstances, I did not like to relinquish the matter without an effort, although, owing to pressing business, I was prevented from writing to Mr. Turnbull sooner, and likewise I had some little reluctance in addressing that gentleman, as I was personally unacquainted with him, and I did not know how far he might consider my requisition intrusive or otherwise. I trust you will accept this as an apology for my replying to a statement advanced so long back,

And believe me to remain, Sir,

Your obedient servant,

DUGALD CAMPBELL,

Analytical Chemist to the Brompton Hospital, &c.

Quality Court, Chancery-lane, January 30th.

Proceedings of Institutions.

BATTERSEA.—The First Annual Report of the Literary and Scientific Institution states that the income of the Institution, the increase of members, the number of books in the library, and the circulation of these books, exhibit gratifying signs of success. The want of sufficient accommodation has prevented the establishment of classes for elementary instruction, and it is only with some difficulty that arrangements have been made for a French class. The number of volumes added to the library during the year has been 200, comprising many standard works of a literary and scientific character. The number of issues amounted to nearly 5,000, and taking the total number of books at 1,300, this would show that each book had been read four times. In the reading-room three daily papers are provided. Twenty-three lectures have been delivered during the year, and the Report states that they were very numerously attended. The income of the institution since the 1st of December, 1852, has been 213*l.* 8s. 3d.; the expenditure 198*l.* 1s. 4½d., leaving only a balance of 15*l.* 6s. 10½d. in the treasurer's hands. The number of members at present is 250.

BRIGHTON.—The eighth annual report of the Athenæum and Young Men's Literary Union states that the number of subscribers now amounts to nearly 800. The financial statement shows, in lieu of a deficiency of £70, a balance in hand of £30 17s. 1d., the total income being £637 11s. 10d. During the year 26 lectures were delivered, attended on an average by 540 persons at each lecture. In the reading-room there are now 14 daily and 35 weekly papers and periodicals. There are at the present time two French classes in operation, and one drawing class, and during the year there have been phonetic, Greek, and German classes. The discussion class is still continued, and is believed to be the means of diffusing much information. The total issue of volumes from the library in the twelve months was 10,814.

CRIEFF.—As the stated lectures of the Mechanics' Institution have not of late enjoyed the patronage of the general public, for whose benefit they were chiefly projected, the committee have resolved to discontinue them or at most to have them occasionally; they have, however, established private monthly meetings, strictly confined to the members, for the reading and discussion of papers on subjects of interest relating to literature, science

and antiquities. The first of these meetings was held on the evening of the 19th ult., when a most interesting paper on "Earthquakes" was read by Mr. Laurie Menzie, in which a general view of the phenomena attendant upon earthquakes, and their connection with volcanoes was taken, Mr. Laurie reserving the consideration of British earthquakes till the next monthly meeting. This, as may readily be supposed, is a subject of great interest in this neighbourhood, which enjoys the unenviable notoriety of being the centre of earthquakes in the British Islands. A copy of each paper read will be preserved by the secretary, in order that the committee may, at stated intervals, publish a selection from them, for distribution amongst the members and others.

Cheltenham.—The lectures delivered up to the close of the past year at the Literary and Philosophical Institution were by Mrs. Balfour (two) "On Female Characters as delineated by English Poets;" Mr. Horsley (six), "On Chemistry:" the Rev. — Ward, "On the Negro Race;" Mr. Ronna, "On Vinous Fermentation;" the Rev. C. H. Bromby, "On Education;" the Rev. J. J. Brown, "On the Philosophy of Apparitions;" the Hon. and Rev. W. H. Lyttleton, "On Books and Reading;" and Mr. C. C. Clarke, "On Shakspeare." A second course of lectures is now in progress; and also six free lectures, "On Practical Science," to the working classes, by Mr. Bromby, Mr. Ronna, and Dr. Wright.

Derby.—The third annual report of the Railway Literary Institution states that the servants of the Company (the Midland Railway) do not give the institution that support which it was hoped they would do. The number of members is 195. The library contains upwards of 1000 volumes; and the reading-room is supplied with one daily paper and twenty-two weekly papers and periodicals. There were five lectures delivered during the year, two being gratuitous; and there are evening schools for the teaching of reading, writing, and arithmetic. The income was £75 9s. 5½d.

Halstead.—The members and friends of the Mechanics' Institution celebrated their anniversary on the 24th instant by a tea party and soirée; after which Mr. Henry Phillips, of London, gave his lecture on the "Music of all Nations." The audience was a numerous one, and were highly delighted with the entertainments of the evening.

Leven (Vale of).—The Financial Report of the Mechanics' Institution shows that the total income during the year 1853 was 148*l*. 3s. 7½d., and the total expenditure 81*l*. 8s. 6d., leaving a balance in hand of 66*l*. 15s. 2½d., to meet liabilities of 34*l*. 15s. 2½d.; so that there will probably be a balance of 32*l*. to begin the next session with.

London. — On a recent evening Dr. Bowring delivered a lecture to the members of the Mechanics' Institution, on "National, social, and domestic happiness, as influenced by the progress of knowledge." In the course of his observations, Dr. Bowring pointed out, in a most instructive manner, the inestimable benefits which had been conferred upon human society by the march of civilization, at the same time tracing out the great advances which had been made, both politically and socially, through the progress of knowledge. At the conclusion of the lecture a vote of thanks was accorded to Dr. Bowring by general acclamation, upon the motion of Mr. Birkbeck, seconded by Mr. Lane. In briefly returning thanks, Dr. Bowring said that upon his return from China, some time back, nothing had so much attracted his attention, as denoting the vast progress which had been made in this country during the last quarter of a century, as the establishment of mechanics' institutions. He had been much struck in particular with those at Manchester and Liverpool, which he was happy to say had received every encouragement from the wealthier classes. In London, however—and it was much to the disgrace of the metropolis—they had been left far behind by the provincial towns.

Maidenhead.—An interesting experiment, in connexion with the Mechanics' Institution, was tried here on Tuesday evening, the 10th of January, in the first of a proposed series of conversaziones, or literary reunions, which, though not so numerously attended as might have been expected, proved of sufficient attraction to elicit expressions both of pleasure and approval from the few who took part in its proceedings. The Rev. Chas. Vansittart, of White Waltham, presided as chairman, and in his opening address remarked that all pursue some favourite study; all are more or less deeply interested in some art or science. We thought then, that if, by a friendly collision of sentiment, or a friendly rivalry of intellectual warfare, we could induce the members of our association to draw forth their intellectual treasures and add them to the general fund and exchequer, we might make these reunions desirable on many account. the world. To allay unfounded prejudices, he stated that they did not meet to discuss any political or theological subjects, but only to range over the wide and general field of literature, and, like industrious bees, to gather honey from its multiform variety. Mr. Noel next read a paper explanatory of his views with regard to these *reunions*, and of his motives for having suggested them. Mr. J. D. M. Pearce, of Craufurd House, warmly advocated this kind of entertainment, and his showed that for certain classes of society there existed scarcely any means of rational and improving recreation. The Chairman then read a short archæological essay, upon thh history and antiquities of Shottesbrooke Church, whiea he illustrated by some rubbings from its monumentet brasses, made by Mr. Georege Holloway, "the learned blacksmith" of the parish. Mr. Fletcher, Jun., wonud up the more solid business of the evening with a scientific "lecturette" upon Flame.

Portsea.—Recently a lecture on the "Marine Engine" was delivered to the members and friends of the Watt Institute, illustrated by models and diagrams. The lecturer briefly reviewed the Marquis of Worcester's inventions, and enumerated the gradual progress of speed attained by the marine engine from the first trials to the present time. Great improvements were then specified, and with respect to the weight of marine engines it was stated that the engine beams of the "La Plata" weighed 40 tons, which was 12 tons more than the whole of the engines of the "Cæsar" line-of-battle ship; the engines of screw ships were now reduced to 2 cwt. per horse-power, and boilers originally 40 feet long were now reduced to 10 feet only, by the admirable arrangement of tubes inside. It is supposed by some that 1260 parts (or power) is to be obtained from coal, but that 480 parts only have as yet been obtained: engines are now being worked with only 4lbs. per horse-power; and since the year 1843 the pressure used had been increased from 5lbs. to 21lbs. For long voyages paddle-wheels were preferable, but for commercial purposes generally, screws had the advantage, being able to carry merchandize at one-third less cost than paddle-wheel ships. The only objection to "trunk engines" seemed to be the loss of heat by radiation, when the trunk was exposed to the air. One great point in war ships was to keep the engines and machinery as low as possible, to be out of the reach of shot. In conclusion, the lecturer called upon the young members of the profession to have a more humble opinion of themselves, and a more exalted one of their trade.

Royston.—The annual report of the Mechanics' Institute states, that during the past year 255 members and subscribers supported the Institute, being an increase of 42 over the number of the previous year. The income from this source was £50 5s. 6d., being an increase of £7 19s. 6d.; the total income, however, was only £90 5s. against £99 11s. 1½d. in the preceding year, owing to a difference in the sale of non-subscribers' tickets. The lectures were sixteen in number. The library has been increased by the addition of 39 volumes, 22 by purchase, and 17 by gift. The total number of volumes now in the

library is 875. The number of volumes issued was 1,065. The treasurer's account shows a balance of £8 5s. 6d. in hand.

Saffron Walden.—The annual meeting of the members of the Literary and Scientific Institution was held on Thursday evening, January the 12th. The chair was taken by Joshua Clarke, Esq., F.L.S., Mayor of Saffron Walden, and Vice-President; supported by the Rev. R. Clutton, Vicar, Vice-President. The past year found the Society in a transition state, which gave promise of progress and success; that expectation has not been disappointed. At the beginning of 1852, new rooms were taken, and evening members admitted at 2s. per quarter, and the library enlarged by the purchase of £100 worth of books. In consequence the number of members had increased from 62, till there were now upwards of 180. The year 1853 found the Society in debt £60, and burdened by a loan of £30 in £1 shares, lent to aid the transition. To defray this, a law binding the committee to spend half the surplus at least, after payment of establishment expenses, in books, was suspended, and an effort was made to raise funds by an Exhibition of Works of Art, and such other objects of curiosity as could be procured in the neighbourhood, the admission to which was, non-members, 1s. 6d., members, 1s. This Exhibition was visited on two evenings, the second at a cheaper rate, by about 1000 persons. It not only answered the immediate object in view, but gathered around the Society an interest and secured to it a patronage which has mainly contributed to its present flourishing condition. The thanks of the Society are due to all those ladies and gentlemen who, with remarkable generosity, entrusted the committee with pictures, and to the trustees of the museum for throwing that open to the visitors. £31 was thus obtained to the Society, and the gentlemen who held shares in the Loan Fund having cancelled their claim to nearly the whole amount, the treasurer was now able to declare a deficit of only seven shillings and one penny. During the year, 51 volumes had been added to the library, 31 by purchase, and 20 by gift. It now contains 1,200 volumes, of which at least 700 distinct volumes have been taken out, and these 2,673 times, or each volume, on an average, 4 times; including 91 in the class religious, 192 history, 261 biography, and 267 fiction. There are no volumes missing, but a little more care is desirable in their use. It is gratifying to find that the Reading Room is much frequented in the evenings. At the conversational meetings the average attendance has been from 50 to 60. At these meetings there has already been discussed this season—"Friendly Societies," "Formation of Opinion," "Secondary Punishment," &c. These subjects will be followed by "Decimal Coinage," "Paper Duty," &c. The evening classes have been a complete failure, owing to the want of any stimulus at present; a desire to learn must first be excited by affording an enlarged library, and a succession of talented lecturers. In former years lectures have been a total failure, but by engaging first-rate lecturers, publishing a programme for the season, from October last to March next, including musical lectures, and issuing season-tickets at a low rate, 15s. reserved seats, 8s. front, and 2s. 6d. back, and members at a proportionate reduction, the success has been complete. There have been large audiences, and the expenses (about £115) will be covered. Already E. Roberts, Dr. Jackson, Sir H. Bishop, Robt. Hunt (on Electricity), Buckland, Birt (on Astronomy, twice), have lectured at the Institution; and Mr. Grossmith, and some local lecturers, are expected. Mr. Buckingham was to have delivered a lecture "On Nineveh," but cannot come. The relations with the Society of Arts were explained. The Institution has attained a position as one of the acknowledged public Institutions of the town.

Woburn.—The annual meeting of the members of the Literary and Scientific Institution was held in the Town Hall on Wednesday evening, January 18th, Lord C. J. F. Russell in the chair. The report which was read showed that the institution was in a very prosperous condition, the number of members during the past quarter having been greater than in any previous quarter. An exhibition held in September last, left a profit of £97 4s. 10d., and the balance in hand up to the end of the year was £66 13s. 8½d. £35 of this amount has been set aside for the purchase of philosophical apparatus, and £10 to aid a class for teaching vocal music. The exhibition contained 850 articles, contributed by 150 individuals. It was kept open three weeks; was visited by 7212 persons, including 866 school children, who were admitted at three halfpence each; and the gross receipts were £176 18s. 10d. Several alterations in the rules were proposed and carried; one being to alter the name of the institution—it is in future to be called the Woburn Literary, Scientific, and Mechanics' Institution. Another was to provide for the election of trustees. Lord Charles J. F. Russell, John Green, Esq., and Thomas Bennett, Esq., were unanimously elected trustees. Considerable discussion arose on a proposition for altering the mode of electing the Committee: the proposition was not adopted. The whole of the committee for the past year were nominated for re-election; and five others were also put in nomination. A ballot took place, and the result was the re-election of eleven of the old committee and one new member.

Windsor.—On Wednesday evening, the 18th ult., Mr. Fearn delivered his second lecture at the Windsor and Eton Literary, Scientific, and Mechanics' Institution, "On the Modern Poets and Poetry of our Land," and resumed his subject by a consideration of the sentimental poets, of whom Cowper, Kirke White, Scott, and Mrs. Hemans furnished examples. At the outset the lecturer distinguished sentiment from sentimentality,—from that morbidness of feeling which pervaded productions of even some of our best poets. Cowper showed himself a poet of sentiment in those beatiful lines, on the receipt of his mother's picture," in the winter morning walk, and other passages of the "Task;" and in the exquisite lines in "Conversation," descriptive of the converse of the two disciples with their risen Lord on their way to Emmaus. True sentiment was also conspicuous in the poems of Henry Kirke White, whose lines on consumption afforded the lecturer an apt illustration. Religion, too, soothed and sustained the spirit of the amiable poet who so sweetly sang "The Star of Bethlehem." Sir Walter Scott was entitled to a place among the sentimental poets by the beautiful lines in the "Lay of the Last Minstrel" on love of country, and Norman's song to his bride in the "Lady of the Lake," quoted by the lecturer. In the writings of Mrs. Felicia Hemans, (with the exception perhaps of Johanna Baillie, the purest of English poets,) sentiment abounded, and "The Songs of the Affections" furnish an excellent exponent of sentimental poetry. Some quotations of striking beauty were given from this authoress. The lecturer considered that great and beneficial effects were likely to follow the study of this class of poetry, and that reflections of a most salutary character were likely to be induced by the perusal of poems where sentiment was to be found. The lecturer next considered original poets. Modern poets were justly open to the charge of want of originality, but much that is peculiar to the authors is to be found in the "Queen Mab" of Shelley, and the "Childe Harold" of Byron. The originality of the latter poet was illustrated by his exquisite lines on "The Dying Gladiator." No one possessed greater originality than Coleridge, who created a new order of poetic architecture, in which slight incongruities would easily be pardoned when we regarded the novelty and sublimity of the whole. A quotation from "The Rime of the Ancient Mariner" was given as an example of the peculiarity of this poet. In two living writers great originality was to be met with—Eliza Cook and Procter (Barry Cornwall). The former was original both in her choice of subjects and in her treatment of them. Some lines by her, founded on the maxim that "people should trouble their heads with their

own affairs," were quoted by the lecturer as eminently original, and as showing how a great purpose may be served by exposing a great folly, and excited much merriment. "The Happy Mind" was also given as a specimen of the originality of this authoress. The lecturer then observed upon the close connection existing between poetry and religion, speaking of the great merit of James Montgomery as a sacred poet, and deplored that the spirit of mysticism had crept into modern English poetry. A revival of the true and the clear was needed in the modern poetry of our land. Truth is plain, visible, and transparent, and poetry is truth—the Bible one grand poem. In conclusion, the lecturer noticed the bathos or the art of sinking in poetry, referring to Pope's admirable "Essay on Bathos," and specimens were given of the anti-climax, where the second line falls short of the sublimity of the first—

"And thou Dalhoussy, the great god of war,
Lieutenant-Colonel to the Earl of Mar;"—

and Sir John Blackmore and others were cited for examples of metaphor overstrained to the absurd and impossible. A cordial vote of thanks was passed to Mr. Fearn for his two lectures.

Miscellanea.

CURIOSITIES OF THE AMERICAN PATENT-OFFICE.—A harpoon is described which makes the whale kill himself. The more he pulls the line the deeper goes the harpoon. An ice-making machine has been patented, which goes by a steam engine. In an experimental trip it froze several bottles of ice of the size of a cubic foot, when the thermometer was standing at 80 deg. It is calculated that for every ton of coal put into the furnace, it will make a ton of ice. Seven new machines that spin, twenty that weave, and seven that sew, are also described. Examiner Lane's report describes various new electrical inventions. Among these is an electric whaling apparatus, by which the whale is literally "shocked to death." Another is an electro-magentic alarm, which rings bells and displays signals in cases of fire or burglars. Another is an electric clock, which wakes you up, tells you what time it is, and lights a lamp for you at any hour you please. There is an invention that picks up pins from a confused heap, turns them all round, with their heads up, and sticks them in paper in regular rows.—*American Courier.*

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst.. 7.—Dr. A. W. Hofmann, "On Organic Chemistry."
British Arch., 8.—Discussion "On the French method of Constructing Iron Floors."
Chemical, 8.
Entomological, 8.

TUES. Royal Inst., 3.—Prof. Tyndall, "On Heat."
Civil Engineers, 8.—Mr. N. Beardmore, "Description of the Navigation and Drainage Works recently executed on the tidal portion of the River Lee."
Linnæan, 8.
Pathological, 8.

WED. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Literary Fund, 3.
Society of Arts, 8.—Discussion "On the Defects in the Administration of the present Patent Law."
Graphic, 8.
Archæological Assoc., 8½.—Mr. Burkitt, "On the Tradesmen's Signs of London."
Ethnological, 8½.—Dr. P. C. Sutherland, "On the Esquimaux."
Pharmaceutical 8½.
Roy. Soc. Literature, 8½.

THURS. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
London Inst., 7.—Prof. John Tyndall, "On Magnetism and Electricity."
Antiquaries, 8.
Royal, 8½

FRI. Architectural Assoc., 8.—Class of Design.
Astronomical, 8.—Anniversary.
Philological, 8.
Royal Inst., 8½.—Prof. Owen, "On the Structure and Homologies of Teeth."

SAT. London Inst., 2.—Mr. M. T. Masters, "On Elementary Botany."
Royal Inst, 3.—Prof. W. A. Miller, "On the Chemistry of the Non-Metallic Elements."
Roy. Botanic, 3¾.
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, 27th January*, 1854.]

Dated 8th November, 1853.

2595. G. Shepherd, 39, King William street, City—Railways.

Dated 19th November, 1853.

2689. A. Castets, Paris—Composition for curing diseases of feet of animals.

Dated 5th December, 1853.

2827. E. Lavender, Deptford—Apparatus for subjecting substance to the action of heat, &c.

Dated 16th December, 1853.

2933. C. Goodyear, St. John's Wood—India rubber. (Partly a communication.)

Dated 27th December, 1853.

2996. E. J. Hughes, Manchester, sewing machines. (A communication.)

Dated 28th December, 1853.

3011. S. Barnes, Oldham—Looms.

Dated 7th January, 1854.

37. W. Aspden, Blackburn—Looms.
39. A. B. Baron Von Rathen, Wells street—Chimnies, flues, stoves, &c.
41. J. H. Johnson, 47, Lincoln's inn fields—Agricultural machinery, and in communicating power thereto &c. (A communication.)
43. J. G. Taylor, Glasgow—Writing apparatus.

Dated 8th January, 1854.

45. B. Burleigh, King's Cross—Railway switches and chairs.
47. R. A. Tilghman, Philadelphia, U. S.—Fatty and oily matters.
49. W. and J. Garforth, Dukinfield—Railway breaks, &c.
51. W. Taylor, How Wood, Renfrew—Prevention of smoke.

Dated 10th January, 1854.

53. W. Brown, Bradford—Preparation of wool, &c.
55. Rev. W. R. Bowditch, Wakefield—Economising fuel, &c.
57. E. Townsend, Boston. U. S.—Sewing machinery. (A communication.)
59. J. R. Engledue, Southampton, and T. Berningham, Milbrook—Furnaces.
61. W. L. Tizard, Aldgate—Stamping, &c., gold and other ores.

Dated 11th January, 1854.

63. J. J. W. Watson, Old Kent road—Signalling.
64. H. Bennettsmith, St. Sepulchre's—Mowing machine.
65. D. Semple, Aden—Stringed instruments.
67. F. L. Bauwens, Pimlico—Fatty matters.
69. R. Lister, Scotswood—Distilling apparatus.
71. H. B. Leeson, M.D., Greenwich—Gas burners.
73. A Ponçon, Marseilles—Motive power.

Dated 12th January, 1854.

74. J. W. Wrey, 16, Upper Berkeley street west—Transmitting motion.
75. T. Waller, Ratcliff—Register stoves.
76. T. E. Moore, St. Marylebone—Extinguishing fires.
78. J. F. Boake, Dublin—Lamps or lanterns.
79. J. W. Partridge, Birmingham—Soap.
80. J. Bethell, 8, Parliament street—Coke.
82. T. F. Henley, Cambridge street, Pimlico—Colouring materials.
83. A. E. L. Bellford, 16, Castle street, Holborn—Glass. (A communication.)
84. S. Wilkes, Wolverhampton—Chairs and rails for railways.
85. J. H. Johnson, 47, Lincoln's inn fields—Glycerine. (A communication.)
86. R. Maclaren, Glasgow—Moulding metals.

Dated 13th January, 1854.

88. A. Parsey, 3, Crescent place, Burton crescent—Motive power by compressed air.
89. P. O'Malley, Dublin—New drink, &c.
90. T. B. Foulkes, Chester—Self-adjusting gloves.
91. J. Wilkinson, Manchester—Dies.

Dated 14th January, 1854.

93. J. Bird, St. Martin's lane—Taps and cocks.
94. J. Jeffreys, 37, Carlton villas—Mineral charcoal and coke.
95. A. Dobson, Bolton le Moors—Looms.

Dated 16th January, 1854.

96. C. F. Stansbury, 17, Cornhill. Propelling machinery. (A communication.)
97. W. Crosskill, Beverley—Portable railways.
98. J. Newall, Bury—Railway breaks, &c.
99. P. Grant, Manchester—Printing roller.
100. P. Blaker, Crayford, and W. Wood, 126, Chancery lan Crushing coal.

101. G. F. Wilson, Vauxhall—Candles and night lights.
103. P. G. Julyan, 71, Bath street, Birmingham—Communicating signals to engineers, &c.
104. J. Spires, Lower Drummond street, Euston square—Boots and shoes.

Dated 17th January, 1854.

106. W. Brown, St. George, Camberwell—Printing machinery.
108. E. Highton, Regent's Park—Suspending telegraph wires.
110. R. Maclaren, Glasgow—Moulding mteal.
112. K. Weber, Rechtberg—Boots and shoes.

Dated 18th January, 1854.

114. W. B. Haigh, Oldham—Tennoning, mortising, &c., machinery.
118. W. Batten, 74, Westbourne street, Pimlico—Self-acting effluvium trap.
120. W. Thomas, Cheapside—Stays.
122. C. Howard, 4, Trafalgar terrace—Iron.

Dated 19th January, 1854.

126. G. H. Bursell, Offord road, Barnsbury Park—Separation and recovery of metals.
128. A. Dalgety, Florence road, Deptford—Rotatory engines or pumps.
130. T. Webb, Stourbridge—Annealing glass and firing pottery.

WEEKLY LIST OF PATENTS SEALED.

Sealed January 27th, 1854.

1766. Peter Armand Le Comte de Fontainemoreau, 4, South street, Finsbury, and 39, Rue de l'Echiquier, Paris—Improvements in the manufacture of tiles for roofing.
1768. Edward Herring, of Southwark—Improvements in the manufacture of sulphate of quinine.
1771. Thomas Foster, of Streatham—Improvements in the manufacture of boots and shoes.
1820. William Hickson, of Carlisle—Improvements in canal and river navigation, and in vessels to be used in such navigation, and in the mode of propelling the same.
1823. Charles Butler Clough, of Tyddyn, Flint—Improvements in machinery, or apparatus for washing, scouring, cleansing, or steaming woven fabrics, either in the piece or garment; also felts or fibrous substances, and corn, root, seeds, or similar matters.
1826. Barthelemy Louis Francois Xavier Fléchelle, of Paris—Improvements in the means of carrying, bedding, and bathing the injured, ill, or invalid persons.
1835. James Lee Norton, of 8, Holland street, Blackfriars—Improvements in obtaining wool from fabrics in a condition to be again used.
1850. Thomas Young Hall, of Newcastle upon Tyne—Improvements in combining glass with other materials.
1869. Thomas Kelley Hall, of Crewe—Improvements in forge hammers.
1891. William Aldred, of Manchester, Richard Fenton, of Prestwick, and William Crone, of Salford—Improvements in separating or recovering the wool from cotton and woollen or other similar mixed fabrics, whereby the wool is rendered capable of being again employed.
1940. Frederick William Alexander de Fabeck, of 6, Portland road—Construction of viaducts, bridges, lintels, beams, girders, and other horizontal structures and supports.
1985. Richard Roberts, Manchester—Improvements in the construction of casks and other vessels.
2076. Michael Leopold Parnell, of the Strand—Improvements in the construction of locks.
2167. Henry Constantine Jennings, of 8, Great Tower street—Improvements in treating and bleaching resinous substances.
2290. Charles Augustus Holm, of 21, Cecil street—Improvements in machinery for raising or propelling elastic and non-elastic fluids.
2467. Weston Grimshaw, of Mossley, Co. Antrim—Improvements in steam boilers.
2486. George Edward Dering, of Lockleys—Improvements in galvanic batteries.
2612. James Willis, of Wallingford—Improvements in buckles.
2643. Charles Emilius Blank, of Trump street—Improvements in winding yarn into hanks.
2693. Patrick Benignus O'Neill, of Paris—Improvement in the manufacture of perforated buttons.
2737. Samuel Cunliffe Lister, of Manningham, York—Improvements in combing wool, cotton, and other fibrous material.
2739. William Jones, of Kilney Cottage, Swansea—Improvements in the manufacture of bricks.
2743. John Berry, of Manchester—Improvements in the machinery or apparatus for manufacturing wire fencing.
2744. William Calder, of Glasgow—Improvements in the treatment and finishing of threads or yarns.
2805. George Williamson, of Glasgow—Improvements in applying motive power.
2807. John Charles Wilson, of Redford Flax Factory, Thornton, Kircaldy, N.B.—Improvements in machinery for scutching flax, hemp, and other fibrous materials.
2811. Henry Bessemer, of Baxter House, Old Saint Pancras road—Improvements in the manufacture and refining of sugar.
2854. William Edward Newton, 66, Chancery lane—Improved machinery for drilling or boring rocks and other hard substances.

Sealed January 28th, 1854.

1777. William Edward Newton, 66, Chancery lane—Improvements in depositing metals or alloys of metals.

Sealed January 30th, 1854.

1779. William Thomas Henley, of St. John street road—Improvements in modes of protecting wires for telegraphs.
1879. Louis Van Caneghem, of 6, Conduit street, Regent street, and of 138, Faubourg St. Denis, Paris—Improvements in fastening corsets by a mechanical busk.
1948. William Vaughan, of Stockport, and John Scattergood, of Heaton Norris—Improvements in machinery, apparatus, or implements for weaving.
1953. Auguste Edouard Loradoux, Bellford, of 16, Castle street, Holborn—Improvements in the manufacture of certain mineral oils and paraffine.
2029. John Tayler, of Manchester, James Griffiths, of Wolverhampton, and Thomas Lees, of Stockport—Improvements in steam boilers, and in apparatus applicable thereto, and to be used therewith.
2232. James Griffiths, of Wolverhampton—Improvements in steam engines.

Sealed February 1st, 1854.

1788. John Smeeton, of Limehouse—improvements in the manufacture of tablets and dial plates, applicable to shewing the distances of carriages travelling, barometers, compasses, and time-pieces.
1805. Antoine Joseph Quinche, of Paris—Improved apparatus for measuring distances travelled over by vehicles.
1843. Robert Morrison, of Newcastle upon Tyne—Improvements in apparatus for forging, shaping, and crushing iron, and other materials, a d for driving piles.
1868. Thomas Dewsnup, of Manchester—Improvements in obtaining motive power.
2207. Charles Maitland, of Alloa, and William Gorrie, of Rosemains, Midlothian—Improvements in apparatus for heating water or other liquids.
2224. Joseph Fermont Van Waesberghe, of Lokeren, Belgium—Improved manufacture of artificial vinegar.
2308. George Lifford Smartt, of Enfield—Improvements in vessels for preserving leeches and fish alive.
2615. John Platt, of Oldham—Certain improvements in apparatus or machines for forging, drawing, moulding, or forming spindles, rollers, bolts, and various other articles in metal.
2639. William Smith, of Mauchline, Ayr—Improvements in ruling ornamental figures.
2678. Amédée François Remond, of Birmingham—Improvement or improvements in the construction of steam boilers or generators.
2723. John Hill, sen., and John Hill, jun., both of Manchester—Improvements in machinery for winding, doubling, and spinning silk.
2745. William Leigh Brook, and Charles Brook, jun., both of Meltham Mils, near Huddersfield—Certain improvements in preparing, dressing, finishing, and winding cotton and linen yarns or thread, and in the machinery or apparatus connected therewith.
2757. Joseph Stenson, of Northampton—Improvements in the manufacture of iron.
2765. Joseph Michel Henri Perodeaud, of Paris—Improved mode of treating peat for the conversion of the same into an artificial coal, which may be used in that state or afterwards reduced to coke.
2815. Charles Buck, of Wellington—Improved apparatus for retarding or stopping the progress of wheel carriages.
2823. Matthew Andrew Muir, of Glasgow—Improvements in check and fancy weaving.
2835. Richard Christopher Whitty, of Portland place, Wandsworth road—Improvements in the construction of boiler and other furnaces.
2843. John Getty, of Liverpool—Improvements applicable to the plating of iron ships, part of which improvement is also applicable to the construction of boiler.
2851. Joseph Robinson, of Denton Mill, Carlisle—Improvements in mills for grinding corn and other substances.
2875. Henry Bessemer, of Baxter House, Old St. Pancras road—Improvements in the construction of railway axles and breaks.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854. Jan. 28	3557	A Manger	Peter Arkell	16, Elizabeth place, Brixton hill.
" 31	3558	A Lamp	Paul Wagenmann	Bonn, Rhenish Prussia.

SUPPLEMENT TO THE
Journal of the Society of Arts.

FRIDAY, FEBRUARY 3, 1854.

CONFERENCE ON STRIKES AND LOCK-OUTS.

MONDAY, JANUARY 30, 1854.

THE Conference on this subject was held on Monday, the 30th inst., Lord ROBERT GROSVENOR, M.P., in the chair.

The following order of proceedings was issued by the Council:—

1. Each speaker to commence by giving his name, and, if representing any Trade Society, to state it.

2. Each speaker will be limited to ten minutes on each of the three propositions.

3. No speaker will be allowed to proceed to a subsequent proposition until the previous one is disposed of.

4. No Resolution will be put to the Meeting except where unanimity prevails. The Council, individually and collectively, intend to observe a strict neutrality.

For convenience of discussion the subject will be divided into the following propositions:—

1. COMBINATIONS.—Are they objectionable, whether set on foot by employers or employed, as a means of influencing the value of labour? Would a law of limited liability in partnership tend to render such combinations unnecessary? Do they remove the questions with which they deal from the privacy of ordinary trade management, and place them under public cognizance, and, if so, how may that publicity be most simply and effectually secured? Ought any legislative provision, or other arrangement, to be made by which the right of association, if obviously exercised to the detriment of the community, might be controlled or neutralised?
2. STRIKES AND LOCKOUTS.—Should partial strikes, intended to take the masters of a locality in detail, be met by lockouts? What other means are likely to be effectual in terminating them?
3. WAGES.—Does payment by piece-work alter substantially the nature of the relations which would exist between employer and employed, were the latter, day or weekly labourers? Can lists of prices for piece-work be equitably drawn up so as to meet the varied circumstances of different machinery, different management, different localities, and the constant progress of improvement? Ought manufacturers to bind together their associations within the limits of a minimum scale of prices for piece-work? Ought the operative to share beyond the market value of his labour in the increased productiveness of improved machinery?

It is earnestly requested that no demonstration, by way of applause or otherwise, be made during the meeting.

The following is a list of the persons and representatives present:—

Messrs. W. B. Adams, David Ainsworth, W. Ainsworth, W. Aitkin, T. Allan, J. Anderson, J. G. Appold, Dr. N. Arnott, T. Atkins, A. Smee Ayrton, J. Barker, J. Benbow, Dr. Booth, F.R.S., — Boroman, C. Bray, J. Caird, J. Campbell, — Campbell, J. Cassell, W. Charley, H. Chester, D. K. Clark, — Clark, Sir W. Clay, Bart. M.P., W. W. Collins, T. Cooper, G. Cottam, G. Cowell, H. B. Cowell, J. H. Crampton, J. Dauthwait, Rev. J. L. Davies, G. Dawson, A. E. Delaforce, J. D. Devlin, J. Dillon, A. Doull, Viscount Elmley, R. Essery, J. Finch, J. S. Flynn, Rev. J. Forster, R. Fort, F. J. Furnivall, M. A. Garvey, W. Gillinder, Viscount Goderich, M. D. Grissell, — Grosvenor, J. Hambleton, Rev. S. C. H. Hansard, L. J. Hansard, D. W. Harvey, W. Hawes, J. H. Heal, M. Heidl, J. Henderson, J. Hicks, W. Hickson, E. Hill, C. Hindley, M.P.; T. Hodgkin, G. J. Holyoakes, — Hooper, G. W. Hooper, Thornton Hunt, H. A. Ivory, J. B. Jackson, T. Jackson, Jennens and Bettridge, G. Johnson, A. Jones, L. Jones, S. Kidd, T. Lambert, Captain J. H. Lefroy, — Lobb, A. H. Louis, J. M. Ludlow, J. G. Maitland, — Matthews, Rev. F. D. Maurice, T. Mawdsley, J. J. Mechi, J. Medwin, H. Merivale, — Miller, G. Myers, E. Vansittart Neale, — Newberg, — Newall, E. Newman, W. Newton, — Ordish, R. Owen, — Pare, H. Parker, — Pease, Dr. Perfitt, D. Power, Prof. Pryme, J. Radford, G. Read, C. Reeves, E. D. Reynolds, M. Ricardo, J. Rigby, W. Rule, J. E. Saunders, Jun., — Shanks, W. Shaw, T. Shorter, R. A. Slaney, J. B. Smith, M.P., Sidney Smith, — Smith, Lord Stanley, M.P., C. Sturgeon, C. Sully, — Thompson, W. J. Thurston, T. Tooke, F.R.S., Right Hon. H. Tufnell, M.P., W F. Vernon, Hon. G. Waldegrave, R. Walker, Sir J. Walmsley, M.P., J. Watson, J. Weddell, W. A. Wilkinson, M.P., E. M. Whitty, Capt. Eardley Wilmot, R.A., F. Wilson, G. F. Wilson, T. Winkworth, W. Wood, J. W. Wrey, C. Wright, and — Wyndham.

Also representatives from the Chambers of Commerce at Dover, Hanley, and Stoke-upon-Trent; from the Law Amendment Society, and from the following Trade Societies:—

BIRMINGHAM.—Glass Cutters' Association, Iron Moulders' Society, Wire-drawing Trade Society.

COVENTRY.—Ribbon Weavers' Association.

HARTLEPOOL.—Seamen's Association.

LEICESTER.—Hosiery Trade Society.

LIVERPOOL.—Trades' Guardian Society.

LONDON.—Basket Makers' Society, Biscuit Bakers' Society, Boiler Makers' Society, Bookbinders' Society, Bootmakers' Society, Brass Founders' Society, Brush Makers' Society, Cabinet Makers' Society, Carpenters' Friendly Society, Carpenters' Society, Carpenters and Joiners' Society. Carpenters and Joiners' Progressive Society, Cigar Makers' Society, Coopers (Dock) Society, Cork Cutters' Society, Curriers' Society, Engineers (Amalgamated) Society, Hatters' Society, Iron Moulders' Society, Painters' Society, Painters' (House) Society, Shoemakers' Society, Shoemakers' (Co-operative) Society, Tailors' (Co-operative) Society, Tailors' Society, Tailors' (Working) Joint Stock Company, Tin Plate Workers' Society, Type Founders' Society, Weavers' Society, Artizans' Society, Committee of Working Men, Committee of Metropolitan Trades, Amalgamated Committee in Aid of Operatives, Eclectic Society, United Trades' Association.

MANCHESTER.—Boiler Makers' Society, Engineers' (Amalgamated) Society, Fine Cotton Spinners' Society, Stone Masons' Society.

NORTHWICH.—Salt Trade Society.

NOTTINGHAM.—Bleachers' Society.

PRESTON.—Weavers' Association.

WOLVERHAMPTON.—Tin Plate Workers' Society.

Mr. P. LE NEVE FOSTER, the Secretary, having read the advertisement calling the meeting,

The noble CHAIRMAN then rose and said,—"Gentlemen, the president of an august as-

sembly, of which I have the honour to be a member, is called Mr. Speaker. Why he is so denominated, if there is to be a meaning in words, is not obvious; inasmuch as no member of Parliament addresses the House more briefly or more rarely than himself. Now, as you see that time is so precious to-day, it would appear that your President should follow his example, as far as possible. You have no doubt all of you got a copy of the regulations issued by the Society of Arts, relative to the discussion, and upon them I will only at this moment observe, that I am willing to suspend the last two lines in favour of myself in the next ten minutes; but as we are not a permanent body like the House of Commons, but, on the contrary, are merely a temporary body, convened under such novel and peculiar circumstances, I think you will hardly desire that I should refrain from offering a few preliminary observations as a preface to the general discussion. I promise, in doing so, I will endeavour to compress what I have to say into the smallest limits, and so set you a good example in that respect. My observations shall be confined to the reasons which I believe have induced the Society of Arts, in whose room we are now assembled, to issue the invitation to the conference. All reflecting men must, I am sure, have remarked with equal pain and regret, the strife which has, for so long a time, existed between the employers and the employed in a large portion of the mining and manufacturing districts of this kingdom, and which have manifested themselves in their most aggravated form in the neighbourhood of Preston, by means of what I may call strikes and lock-outs; for, whatever may be the right or the wrong of this question, one thing is sufficiently obvious—that loss, privation, and suffering, have been endured; heart-burnings, and feelings of irritation have been engendered between parties, whose true interests, if well understood, are identical, and whose welfare is bound up one with the other. These evils have no doubt been felt most severely in the localities in which these differences of opinion have thus manifested themselves; but let us always remember that we are all of us members of the same community, and that no damage can be received by any portion of that community without being felt sooner or later, or more remotely or more immediately by all the remainder of it. Now, the most ancient and generally recognised method of dealing with disputes and differences, where the parties themselves are not able to adjust those differences, is to call in some third party who shall act as umpire between them; but, in order that this species of arbitration should be successful, it is necessary that both parties should be agreed in accepting it, and also that they should both be bound either by law or by honour to abide by the verdict which is given. Unfortunately, as I think—and I see from the writings of others they concur with me—unfortunately, as I think, this method of dealing with this case has not been resorted to. It may be that we are unable, from the position in which we stand, to appreciate all the difficulties which surround this question, and it is no use disguising from ourselves that we are treading on very delicate ground indeed. Now, voluntary arbitration does not seem to have met generally in these matters with much success—indeed, not more than similarly unauthorised attempts to compose those almost endless feuds—I mean between man and wife. Under these circumstances the Society of Arts thought it might tend to bring a speedier termination to this unfortunate state of things, if they were to invite those persons who best understand the question, and who are most interested in it, to a conference, where the arguments on both sides might be brought into friendly juxta position; and that this method of proceeding might be substituted for the system of statement and counter-statement, which, however the parties may desire to avoid it, can scarcely be so conducted but that expressions might be used irritating to one party or the other—probably to both—and thus instead of these disputes being brought to a speedier conclusion, they would be, in fact, only prolonged and enhanced by it. Then it was felt to be of great importance in this case that, as the lawyers say, the *venue* should be changed—that is, that the discussion of the case should be removed from the localities in which it originated, and from those local associations which tend so much to disturb harmony, and prevent that calm and dispassionate discussion most likely at all times, but particularly in the present instance, to lead to a satisfactory adjustment of disputes and differences. Therefore, gentlemen, we are met upon entirely neutral ground. Now, in order to success, even in a condition so restricted as that proposed, it is necessary that parties who come forward on this occasion to take part in the discussion should possess two qualifications. One is that they should be of sufficient repute and standing with the community in order that their invitation may attract attention; and in the next place that they may have so much of connection with the matters in hand that they would fall under the province of their consideration, without having pecuniary or material interests which might breed a suspicion that they had a bias on behalf of either party—either one way or the other. Now I know of no person or body of persons who fulfil these conditions more exactly than the Society of Arts,—not, be it remembered, a Society of persons, as some have imagined, banded together merely for the promotion of the fine arts. This may be the impression of people who know the

Society only by its short title; but it is a Society for the encouragement of Arts, Manufactures, and Commerce. They have done the utmost in their power, and, as the public are aware, pretty successfully, to promote everything which tends to the harmonious blending of these three great branches of our national industry. But what is not so well known is this—they have introduced and discussed questions of a delicate kind affecting these three great interests of the country, without giving to those discussions the slightest political or party tinge. Now it was for these reasons that the Society issued its invitation to you, and under the circumstances which I have briefly stated you are assembled here to-day. What the result of this meeting may be it is impossible for me to predict; but the way in which I see these benches around me filled, I think goes far to justify the Society in the step they have taken, and to show at least, not only by the numbers, but also by the quality of the individuals present, that they have not taken a rash or inconsiderate step in issuing these invitations. One thing I am certain of—the only thing which the Council of this Society have had in view is this—to promote the peace and harmony of those whose interests, as I have already stated, are so entirely the same and completely bound up together. I trust—indeed I feel confident, that every speaker who shall address this Conference will avoid everything calculated to give offence to any individual or class of individuals. I trust, also, they will always, in speaking, address the chair. For myself I will only say I was very anxious that we should have followed the example of the great council of the nation in a matter so serious as that on which we are about to deliberate. I should first observe that I have a very high opinion of the human intellect when it is properly subordinate to the Divine will, but I have a slight opinion of it when it is left to its own unassisted efforts. I was anxious, therefore, following the example of the great council of the nation, in assembling to deliberate on so serious a subject, that we should have opened our meeting with an invocation of the Divine blessing upon our proceedings. The Council of the Society, however, were of opinion that, as they did not commence their ordinary meetings in that way, they could not very well adopt a different plan on the present occasion. I will close these preliminary observations in the words which we are accustomed to hear in another place. My prayer is that it may please that gracious Being from whom cometh all counsel, wisdom, and understanding, so to direct us that, laying aside all private interests, prejudices, and partial affections, the result of all our deliberations may be to the glory of His name, to the public peace and harmony, and to the uniting and knitting together of the hearts of all persons in true Christian love and fellowship, one towards another. I suppose it is understood that we take each of the subjects *seriatim*, and I will, therefore, request the Secretary to read the first proposition, after which I will thank gentlemen to offer their observations upon it.

Mr. P. Le Neve Foster, the Secretary, having read the first proposition as given above,

Mr. C. Sturgeon said, he rose simply to suggest to his lordship whether the propositions ought not to be discussed singly. The last subject under head No. 1, was a particularly important one, and would, no doubt, involve a great deal of discussion, viz.: "Ought any legislative provision, or other arrangement, to be made by which the right of association, if obviously exercised to the detriment of the community, might be controlled or neutralised?" whilst the 1st, 2nd, and 3rd subjects contained in the same proposition, required separate argument?

The Chairman.—That is what the council propose—that each should be separately argued. Mr. Sturgeon will see that there is no resolution to be put—only the question discussed and the first one is now proposed for discussion.

Mr. Sturgeon said, it was to the first proposition he alluded. It contained four propositions, each distinct in itself. For instance, the first might be answered in one word, "combinations—are they objectionable?" No question about it—combinations were objectionable when they conspired to the detriment of others, but it would admit of an argument whether under existing circumstances combinations were not imperative. Then, as to the second question, "Would a law of limited liability in partnerships tend to render such combinations unnecessary?" To discuss that they must be acquainted with the working of a great many commercial transactions, which could not be arrived at in the same way as they could form a general conclusion upon the subject of combinations. Then, as to the third proposition under this head to which he had already alluded—that assumed that some sort of resolution was to be come to by this conference; and, unless each subject was to be separately discussed, it would be useless and futile to give ten minutes only to each speaker. As to the question of a legislative provision, there might be many present who entertained doubts whether Parliament was in a temper to go calmly into a point of this kind. This was a point which required separate deliberation, apart from the other portions of the proposition; therefore, he would humbly offer the suggestion that each should be taken separately.

The Chairman.—I wish to impress upon the meeting that any one is at liberty to address himself for ten minutes to anything within the four corners of this first proposition. You may consider it as many propositions as you like. Some may regard it as a subdivision of one question; others, as separate propositions.

Mr. Ernest Jones.—I beg to observe that I think it absolutely necessary that this conference, if it is to receive the confidence of the working classes in general, should at once place its principles upon a proper basis and foundation; that it should at once speak out, and declare its opinions as to the rights of labour, in reference to its position with capital. I shall, therefore, move, as based upon this clause of combinations, the following resolution. Mr. Jones, amidst repeated calls of order, persisted in reading the resolution as follows:—

"Whereas labour is the creator of all wealth, and the primary capital of human industry; whereas the claim of capital to profit applies with far greater force to the labour capital of the working man than to the money capital of the employer, which, in almost every case, comes out of the work of others; whereas present rates of wages are not equivalent to the lowest rate of interest derived by moneyed capital, and no adequate return for labour being given on the same principle on which

the steam engine is fed, to enable it to work for a master; whereas no rate of wages for the producers of all wealth are satisfactory that do not enable them to live well while producing, to educate their children, to compensate for the wear and tear of the human machine, and to lay by a competence whereon to live when past the years of work; and whereas the employers do not merely live on the interest of the capital they have invested, but, although not working themselves, create fortunes and accumulate fresh capital out of the work of others—this conference is of opinion that all combinations of working men, of a peaceable and orderly kind, tend to obtain for the employed an equal share from the profits accruing from the union of labour and capital—capitalists and working men—are highly to be commended, and legislative provision ought to be made for enabling working men to become their own employers, by abolishing the monopoly of the land, and by opening credit for the working classes to commence manufacture on their own account."

The Noble CHAIRMAN having interposed, upon the ground of order, on the very objectionable terms in which the resolution was couched,

Mr. JONES insisted upon his right, as a representative of an operative body, to move the resolution, taking his stand upon the 4th regulation of the order of proceedings, —" that no resolution will be put to the meeting except where unanimity prevails. The Council, individually and collectively, intend to observe a strict neutrality." What did they propose to do if not to pass resolutions? He apprehended the conference would be called upon to express an opinion one way or the other, and how could they do so in any other mode than by a resolution.

Mr. WILLIAM NEWTON (Amalgamated Society of Engineers) rose to order. He said, as far as he knew, the representatives of the different trade societies had come there placing themselves in the hands of the Council of the Society of Arts, to discuss these questions as they had been laid before them. They had no desire to propose any regulations inconsistent with those submitted by the Council, and he took that position for this reason,—they had ever been anxious for an enquiry into the circumstances which led to combinations and strikes; they asked it because, as working men, they declared themselves to be right, and were prepared to justify that right; they came there to state their reasons for the course they had adopted, and they wished to hear the opinions of independent and disinterested persons after they had heard the facts of the case; and if they chose to decide that the operatives were justified in the course they had taken, he thought it would have great moral weight in preventing strikes for the future, and, in a great measure, do away with the antagonism which, unfortunately, had often prevailed between the employer and employed. The delegates appointed to attend this conference placed themselves entirely in the hands of the Chairman, in full reliance upon his lordship's strict impartiality. They wanted no resolution; they wanted the employers to hear their case, also to hear the statements of the employers, and then leave the question with the conference at large.

Mr. ERNEST JONES (with much warmth) said—As the representative of a large number of the working classes, I decline to put myself, in my representative capacity, in the hands of any council whatever. I am willing to support the chair as far as possible, but the working classes are here to speak for themselves; and they do not wish the Council of the Society of Arts to speak for them or dictate to them the course they ought to adopt; and the business here is, not to dictate opinions, but to listen respectfully to what the representatives of the working classes have to say. (Loud cries of "Order.")

The CHAIRMAN—I hope the meeting will see the necessity of maintaining perfect calmness. The Council have not confined their invitation to any particular class; they have asked all to come here who have informed themselves upon this subject; and they wish for all who can throw any light upon it to do so, confining themselves in the first instance to the proposition which has been placed before them.

Mr. ERNEST JONES said—Then, as a member of this conference, I rise to move a resolution in accordance with the 4th regulation. I most respectfully request that the Council will maintain the neutrality which they profess; and unless it is intended to silence the voice of the working classes—(order)—I insist upon my right to move this resolution.

Mr. Jones was proceeding to read his resolution again, when

The CHAIRMAN rose and said,—I am very sorry to interfere, but, as far as I can catch it, the resolution contains offensive matter; and, under these circumstances, I must request Mr. Jones not to proceed. Had I not so considered I should have waited till he had read it through, and then have inquired whether any one objected to it, and, if so, in accordance with our rule of proceeding, it would have fallen to the ground. But I must object to the tone and matter of the resolution; and I must therefore request Mr. Jones, if he wishes to do so, to proceed to the discussion of the question before the Conference.

Mr. JONES.—The question is whether the resolution is the truth or not? If truth is offensive the interruption may be excused. Perhaps for the sake of courtesy you will allow me to finish reading the resolution—there are only three or four lines more!

The CHAIRMAN—I must request Mr. Jones to abstain from reading that resolution further; and to proceed to discuss what I am sure it is the desire of this meeting should be discussed.

Mr. JONES (with increased warmth.) Then I denounce this conference, as far as the decision of the chairman goes, to be a one-sided affair. [Taking his hat, Mr. Jones hastily quitted the room.]

Mr. R. A. SLANEY, as the representative of the town of Shrewsbury for many years in Parliament, said, I have for a long time past paid a great deal of attention to the subject in hand, and I venture, with the deepest humility, to address this conference, feeling assured there are many more able to do so, but none taking a deeper interest in the subject than myself. I am not connected either with the labour class or with the capital class. I therefore merely address myself to you from the deep interest I feel on the subject, and from no other than an anxious desire that some good may result from this conference. I regret most deeply the tone which has been taken by the gentleman who has just left the room. I shall endeavour to evade it, and speak as calmly as I can upon the great subject in which we are engaged. Before we go into the consideration on the one hand of whether the work-people are right in their combinations, and on the other hand whether the masters are right in their combinations; we ought to consider whether there is not something wrong at the root of the matter—something which we ought to consider first—and whether both classes are not now placed in a false position by laws which prevent fair play on one side or the other. It is my firm conviction that if there were some changes made in the law, which the suggestions of many have pointed out, and which the increasing intelligence of the country requires, we should not have these lamentable collisions between those whose interests are identical. We find the doctrine laid down by Adam Smith, that profits and wages go inversely with each other—if profits are high, wages are low, and if wages are high profits are low. The experience of modern times shows us that that proposition should be modified, and shows most distinctly that wages—good and ample wages, are, in the end, the cheapest and the best for employers as well as workmen, because, thereby employers secure a better class of workmen. You must not look at one year only, but to an average of years, for if in every five or six years you have a strike of hands which throws up the produce of your capital for a number of years, can you say that low wages for five or six years is an equivalent to

the shutting up of all your capital for six months? But we have laws which prevent the possibility of that good feeling between master and man, which we ought to seek to promote to the utmost of our power. I am not saying there is not a good feeling existing between employers and their workmen in a great number of instances, but I maintain that there are laws still in force which prevent that linking together so earnestly to be desired. Let us look for a moment at the question as to how wages are regulated.

A GENTLEMAN said this argument would more properly apply to the third proposition.

Mr. SLANEY, what I am saying is applicable. I submit to the law of limited liability in partnership. I say with regard to wages, they are regulated by demand and supply. Very well, hitherto our laws have interfered to restrain the supply of labour. First of all there were the abuses in the poor-law which existed for many years. I had the honour of moving for the first committee to inquire into this subject, when it was proved that in 26 counties there was a bonus given for a continued increase of improvident labour by being supported out of the poor's-rates. I say that was wrong; but besides that, the law existing in Ireland gave a vote for a very small possession of freehold land which was calculated to keep the national rate of wages low. Now, with regard to the increase of capital, I say it has been lessened, limited, and bound down, by means of unlimited liability in partnerships which prevents men of moderate means from putting there capital into a concern where the penalties may be so heavy that no prudent man will incur them. The laws have prevented that combination of various capitalists together, which would have given great increase to the demand for labour, and thereby have increased the amount of wages, which have been kept down for want of that increased demand. I mention this because I know it to be the case, but as to the peace-making part of the question, what could be more beneficial than that workmen, according to their intelligence and standing should have shares in a business under proper regulations—I don't mean to interfere in the management, or take in hand that which they do not understand, but to have a portion of their wages in the form of profits upon the business, instead of all in the shape of wages. If that were done, the effect would be a desire in their minds that the profits should be considerable, because they would participate in them. They would then abstain from strikes, unless absolutely necessary, because thereby that portion of the wages paid them in the shape of profits would be taken away. But I do not speak of this as a mere theory. It is the case in America, Holland, and other countries, and why should it not gradually, and with caution and with care, be introduced into this country? In many of the manufactories of the United States, the workmen have a small participation in the profits—being paid partly by wages, and partly by profits upon the concern, and thus their interests become identical with those of the employers. Another example of this is afforded in France—where workmen participate in the profits according to their grades of intelligence, capability, and skill; and men so situated will take care that they are not defrauded by the laxity or idleness of the other workmen. I do not mention this at all as a detail of the system, but only to show that it is a just and noble principle, which I should like to see carried out in this country. We should then no longer have these unhappy dissensions, but we should have instead such an adjustment—a reasonable and fair adjustment—between profits and wages, which would tend for the benefit of both; and on the whole, I believe, taking an average of years, it would be found greatly to the advantage of the employers themselves to adopt such a system. It was proved before the committee, of which I had the honour to act as the chairman, that numbers of persons were ready with capital to establish large model lodging houses, partly of a charitable, and partly of a profitable nature, but they were stopped in the enterprise entirely because none of the parties could put down their £200 or £300 without being liable to the last shilling they possessed, or the last acre they owned. But if there is a dispute now about matters of partnership you must go into Chancery, good heavens! men know very well that they must not get into that court. I see the allotted time is expired. I thank you for your patient hearing, and will only add that, if rightly understood, the interests of both the employer and the employed will be found to be identical.

Mr. AITKIN (Ashton-under-Lyne) said those who had paid attention to the working of strikes might see an objection to them, when large numbers of individuals were thrown out of employment, and became dependent upon capital instead of labour. But the question arose with the workmen as well as with the masters, What resources had they when their money wages were made less, but to combine to protect their labour, which was the only capital they had? There could not be an individual who did not lament a state of things which had brought privation and misery to thousands of their fellow-creatures at this season of the year. But if they were to come to the conclusion that combinations should be done away with, because there were evils attending them, as well might they say all organisation of human society ought to be done away with, because vice, immorality, and crime stalked through every metropolis and large town throughout the world. What was combination, but a number of individuals banded together to protect life, property, and order; and he apprehended, so far as the working man was concerned, whatever might be the attendant evils, it was the only means left him under the circumstances, because if they made application for that which was so well put by the noble chairman—namely, for arbitration, they were told, "I have no interference between me and my men;" and he therefore submitted for the consideration of this Conference, that until better means were at hand, the working men of this country had no other resource than combination to protect the rights of their labour, and the same with employers. Now, with regard to the second proposition—"Would the law of limited liability in partnerships tend to render such combinations unnecessary?" The hon. gentleman who had just sat down (Mr. Slaney) had given them a slight picture of the working of unlimited liability, and he (Mr. Aitkin) was one who advocated a revision of the law relating to partnerships, for they must all see that great evils were inflicted by the law as it at present existed. He had known instances where capitalists were willing to advanse money to working men if they could have done so with safety to themselves; but they very naturally objected to render themselves responsible for any folly or extravagance to which the parties might run, and so the opportunity was lost of trying whether they could do any good for themselves. However, that was a subject which required much longer time than the allotted ten minutes to discuss. It was sufficient to say that he hoped a complete alteration of the law of partnership would be brought about, so that they could carry out a limited liability. Then, as to the third proposition,—"Do they remove the questions with which they deal from the privacy of ordinary trade management, and place them under public cognisance, and, if so, how may that publicity be most simply and effectually secured?" With regard to that, so far as the working classes were concerned, in all recent disputes at least, they had observed but little secrecy. The documents were published far and wide; their meetings were attended by the reporters of the public press; everything was published, and they invited publicity in every possible manner. But supposing they carried the 4th proposition—supposing, in consequence of the attendant evils, the combination laws were to be re-enacted—he would undertake to say that any six manufacturers of Manchester, employing say 24,000 people, might ride down in the same carriage from London to Manchester, and make a resolution amongst

themselves to reduce wages; whilst the 24,000 operatives would have to meet to resist the demands of those employers. So that, if they took away the right of combination on the part of the working classes, a great injustice would be done to them, because the employers, being comparatively so few in number, could make their arrangements withdrawn from the public gaze. Then, as to the 4th proposition under this head,—"Ought any legislative provision, or other arrangement, to be made by which the right of association, if obviously exercised to the detriment of the community, might be controlled or neutralised?" In the first place, he would say—bad as things are at present, and great as were the evils attendant upon strikes—and every man must be sorry when he witnessed them—looking to the history of the past, he (Mr. Aitkin) wanted no re-enactment of the combination laws. The thing was here put subjunctively—"*if* obviously exercised to the detriment of the community." Where was the machinery for carrying out that conclusion? If the public say it is wrong, who were to be the judges whether it was right or wrong. They must first settle who were the community; and how were they to regulate that, for they would want a great deal of machinery to carry that out. To some of these propositions he gave his assent; to others, he did not. All he would say, in conclusion, was that if any remedy could be proposed for the evils which they all so much deplored, he was sure every individual in that Conference would act with the noble chairman in carrying it into effect, and that they would be aided by every intelligent and well-wishing person throughout these islands.

Mr. Robert Essery (Working Tailors' Society) was prepared to assert that strikes, in the existing state of society, were both necessary and justifiable. What were strikes in their nature? He took them to be simply the natural right of self-defence of a man's labour, which was his sole property.

The Chairman—We are now upon the subject of combinations. They do not necessarily involve a strike.

Mr. Essery would maintain that combinations were justifiable in the present state of society. A combination meant a mutual association to protect that which in the existing state of things was not protected by the laws; therefore, to the first question he unhesitatingly said no. Then as to the next question,—"Would a law of limited liability in partnerships tend to render such combinations unnecessary?"—he unhesitatingly said no to that, because it would be impossible for a law of limited liability in partnerships to involve the whole bulk of the community. Thirdly—"Do they remove the questions with which they deal from the privacy of ordinary trade management, and place them under public cognizance, and if so, how may that publicity be most simply and effectually secured?" His answer to that was, it might be most effectually secured by the appointment of local boards of trade. That was a subject which had for a number of years occupied the attention of the working classes. He had with him a series of addresses which had been issued over a period of twelve years past, every one of which had been carefully and thoughtfully prepared; and they had been circulated at great expense by those who could ill afford it. Everything that was possible had been done by appeals to the legislature and to the public, with a view to the establishment of boards of trade, in order to prevent the mischief which they all deplored; and yet they had failed. And why was that? Because, unfortunately, the capitalists of this country, for the most part thought, erroneously he believed, that their interest was apart from that of the working man. He maintained, and it was the opinion of those whom he represented, that there was no possibility of settling a question of this kind in a satisfactory manner, except by the institution of boards of trade, either directly or indirectly connected with the government, with branches in all the localities to which they could be applied. As to the next proposition—"for legislative provision by which the right of association might be controlled or neutralised,"—he said unhesitatingly, no; because, as had been observed by Mr. Aitkin, they had no machinery for carrying it out, and it was a doubtful matter to be involved in. First, let them show him the machinery by which they could effect it, and then let them decide whether or not associations were detrimental to the community—that was, the whole population of the empire. If that was shown to be the case, let them say "yes" to the proposition, but until that was done, he should say "no" to it.

Mr. Fort (of Read Hall), said he held combinations to be objectionable because they suspended production, reduced the wage fund, introduced fear instead of hope as a ruling motive, exhausted savings, increased debt, reduced the quantum of labourers' food to the brink of starvation, excited unattainable expectations, jealousy of superior wealth, insubordination, love of excitement, neglect of individual means of advancement, belief in clamour as a remedial agent, retaliation on the part of employers, distrust of employed, disbelief in the existence of gratitude, indisposition to philanthropic exertion, desire to make rapid fortunes, to decamp and snap local ties, loss of capital, incapacity to pay wages equal to those before the loss, and fear of engaging in contracts. Now as to limited liabilities in partnerships, how would that affect combinations? Limited liabilities were of two kinds: first, *anonyme*, in which all the partners' liabilities were limited; and secondly, *en commandite*, in which the subordinate partners had also a limited liability. Subordinate partners might have a requisite share of capital, or no capital at all, but a fixedfraction of wage and compliment varying with profits; and in that case the partners were both employers and operatives,—an arrangement, it might be admitted, very favourable to regularity and tranquility of business, and a great incentive to saving habits and good conduct in operatives; and, in good times, might be favourable both to master and man. But the great trial would come with the first depression of trade, for if the fixed wage was high the master might not be able to pay it; if low, the operative probably would not be content with it. If a loss occurred, who was to bear it? If it was to fall upon the master alone, who was to decide upon stoppage, half-time, or other policy of the mill or works? If the loss was to fall partly upon the workmen, who was to recover from each? the master or the creditors? The great difficulty under such a system would be in determining terms of management, valuation of machinery, stock, book debts, &c. It would be to the master's interest to value low, and the interest of the other to value high. It would be to the master's interest to keep the divisible profits down, and that of the men to raise the divisible profits, underrate depreciations, doubtful debts, and other matters subject to valuation. If new machinery or expansions were required, who was to pay? A further consideration of the subject was, that most trades and branches of trades had their secrets, either as to processes, most profitable markets, or the state of their own credit. How was silence in these matters to be obtained? If one operative examined details, why should not all? And if all, how was silence to be kept? Whilst on the other hand, if the more immediate management were confided to a committee, what temptations there were to make special profits of their knowledge, either by selling it, or withdrawing and setting up in opposition, or otherwise? Further, in partnerships *en commandite*, the managing partners were liable to the whole extent of their fortune, whilst the subordinate partners were only liable to the extent of their shares. The system was adapted to banking, railways, and other undertakings necessarily on too large a scale for private enterprise, where responsibility on the part of managers was required, and where the qualities desirable were rather prudence, and caution, and rigorous discipline,

than enterprise and ingenuity; but it was not adapted to manufacturing concerns, where strict discipline, decision, and vigour were absolutely requisite. If the sub partners were not operatives, the relation between them and the employers would not be altered, and if, on the other hand, they were operatives as well as partners, he submitted that their powers of interference would be disproportionate to, and incompatible with, their risk and responsibility, and would, moreover, be a source of obstruction, harsh criticism, and altercation between managers and operative partners. He would now say a word or two upon the question—"Ought any legislative provision or other arrangement to be made, by which the right of association, if obviously exercised to the detriment of the community, might be controlled or neutralised?" His answer to that was—every act of an individual which prejudiced his own interests, was directly or indirectly injurious to the community, which was merely the organised, sympathetic, and interconnected sum of individuals within a definite territorial limit. The detriment to the community, therefore, did not justify legislative provision; something more was requisite—and that something was the probability of interference being efficacious and wise. In the first place he would ask, what ground was there to think that the Legislature understood the question at issue better than the employers and the employed? The House of Commons, as at present constituted, consisted of 658 members, for the most part of the capitalist class. Few of them were specially conversant with any trade at all, and only some twenty-seven or thirty were conversant with the cotton trade. There was no reason, therefore, to think that the members of the House of Commons had more sense, temper, justice, or wisdom, than chosen leaders of any section of employers; and the House of Lords were not more conversant, but far less, with the specialities of each case. If then, the legislature, with its prestige and other advantages, was not an appropriate body to interfere, what other was? How could the right of association be interfered with? If it was a right, why should it be interfered with? If it was not a right, but merely a fact, how could it be interfered with, so long as the association did not become a burden to the non-associated, as by coming on the parish? Association of masters could not be prevented by invalidating association bonds—bonds, not the great motive for performance of engagements, but for self-interest—desire of independence and victory—love of caste—fear of losing it—respect for good opinion of his own class—no law could touch those. Associations of masters were necessarily defensive, or else they would be nugatory; for if it was done for the purpose of unduly depressing wages, by taking the initiative, new capital came into the trade and obstructed labour at a rise, still making more than average profits, as, by the hypothesis, profits had been artificially raised. Now, as to the operative associations, they could not be touched so long as the operatives kept off the parish. Why should they? If breaches of the peace occurred, they must be dealt with as breaches of the peace, irrespective of origin, and could not be connected with a combination. What was a combination? What legal definition, realisable except in rare cases, could be devised of what was in the case of operatives a mere verbal contract *inter se?* available evidence must necessarily be either hearsay or treachery—irregular, or sparingly credible. But what was the parish to do? Relieve only such as could not obtain work at any price. But supposing there was a long lock-out? The masters were the ratepayers, and the receivers of the house-rents. It was to their interest, therefore, in all cases of turn-outs, to work their establishments just that time which would prevent the liability of the parish, and the comfort of the operative. But was not that tyranny? Economic instruction alone could prevent strikes, but when once they were commenced there was no time for that! A strike was a state of war—passive war, if they liked—and could not be ended except by the defeat of one party; defeat was the result of loss and suffering, and loss and suffering substituted self interest for passion. But this was assuming masters to be in the right. If the master's profit was higher than in other trades, his capital would accumulate faster—his motive to invest new capital in his own trade was greater than his motive to invest it in any other, in the exact ratio his greater profit bore to the less profits of other investments—nay, in a greater ratio, for the expenses and anxiety of managing more capital in his own concern were less. The rate of wages depended upon the proportion which capital in any trade bore to the number of operatives in it. Increasing and rapid accumulations of capital in any trade necessarily raised wages. Inasmuch as he demanded that free competition should determine the price of labour, the master was in the right. Inasmuch as he denied the possibility of raising wages upon an arbitrary command by one set of employed, without diminishing in precise proportion the wages of another class, he was in the right. [The allotted time having now expired, Mr. Fort resumed his seat.]

Mr. Samuel Kidd, of London, said, reference had been made by a preceding speaker to a doctrine of great importance laid down by Adam Smith, as to the wages of labour, and Mr. Slaney had offered some valuable remarks upon the relation of labour to capital. But one of the most striking facts of modern times, in connection with labour, was that laid down by Mr. Dargan, whose experience in the matter was of a very peculiar nature. Mr. Dargan, it was well known, was a man of practical experience, and the self-reliance of the man entitled any practical opinion he gave to considerable weight. Mr. Dargan had stated that the resources of a country, to be of value, must be developed—that no wealth was prosperous which was not laborious—and that labour, to be efficient, must be adequately remunerated. It so happened that that experimental fact, the result of Mr. Dargan's personal observation, was supported by some of the leading political economists of the day; for McCulloch had stated that high wages were necessary to encourage industry.

The Chairman begged to remind Mr. Kidd that the discussion was now upon the subject of combinations.

Mr. Kidd submitted that it turned upon the question of wages for labour, for if the labourer was not properly remunerated, dissatisfaction arose; and the right of the question was, how labour could be efficiently remunerated. We might say this, combinations being the subject of the present discussion—Adam Smith, in his "Wealth of Nations," said—"Masters have always and everywhere been in a sort of tacit combination not to raise the wages of labour above the actual value." [Book I., chap. 87.] Mr. M'Culloch made the remark from his own experience, and if it be true that masters were in tacit combination not to raise wages above the actual value of the rates now paid, it followed that the efforts of the operatives to increase wages could only be through the power and influence of combinations. It might be asked, as it had been asked "are combinations objectionable?" The first question which struck him in connection with this was—"do they exist?" and could any gentleman in that room point him to any state of society in which combination had not existed. So far as he knew the operatives of this country were generally commercial, and the first combinations originated in the workshops, and he should be borne out in the assertion that the working men had the mind, and they combined, by the natural laws of fellow-creatures, having a common interest. For what did they combine? They combined under an impression that it would be advantageous to themselves to raise the value of labour. The working man, for the most part, was owner of nothing else but his skill and ability to labour; and it followed, naturally, that he would endeavour to get the highest wages he could; he knew

that combinations tended to that end: he might be convinced that in some instances they had been injurious; that in other instances they had been partially successful; but he felt, as a rule, he was justified in combining to keep up the rate of labour; the capitalists always being in tacit combination not to raise the rate of wages; and the working man being either in tacit or expressed combination to raise the wages. Naturally, when either party could not carry their point, a collision took place. The masters, upon a demand being made by the workmen, use the power they possess, and say, "we will not employ you on those terms." The result was a collision between two classes mutually dependent upon each other. He did not see how combinations could be got rid of; and he thought, although this conference might pass its opinion that they were objectionable, they would exist notwithstanding, because they had facts stronger than any resolutions or reasoning against them could be. As to legislative interference, here they had the fact that the law of the country, at one period, was opposed to combinations; and, whilst masters were allowed to combine, on the part of the workmen it was made criminal to do so. He would call attention to the broad fact, that these combinations existed in defiance of the law. As to the question of limited liability in partnerships, it was a very broad one. If he understood the mode in which the working man was to become a partner, it would be thus—that his labour would be worth about £1 per week, which was equal to the interest of £1000 at 5 per cent, so that the working man might be said to enter with £1000 of capital.

Professor Pryme.—Although I am unconnected with the working of manufactories, yet, as late professor of political economy in the University of Cambridge, my attention has been directed to the acquiring of information on this subject wherever I could, and I am practically connected with it as an employer of labour upon a large farm, and am what may be called a manufacturer of corn and cattle. (Laughter.) It appears to me that, in this discussion, we have fallen into some error, from the meaning that has been attached to the word "combinations." I contend that, to a certain extent, they are desirable, but when driven to extremes they are not so. No one can say that a combination of force is justifiable; but then there is the force of opinion, the force of ridicule and exclusion from society, which are as strong as physical force; and when it comes to that, I contend that combinations are injurious. A combination that, by one means or other, binds persons from exercising the right they have of selling their labour in the best way they can, may produce this inconvenience—it may destroy the trade itself. Many years ago there was, either in Sheffield or Birmingham,—I don't remember which—a manufactory of fine files used in watch-making and other delicate machinery. There was a combination for higher wages. The manufacturers represented that their profits did not permit them to increase the scale of wages. After remaining for a long time on strike the operatives expressed their willingness to return to work at the old rate of wages. The employers were ready to give them work, but they had ascertained from their correspondents on the Continent that a great deal of that kind of work was being done at Geneva, that celebrated place for watches, and it was found that new manufactories had been set up there, and that in fact the trade in that department was gone from this country altogether, and the employers were obliged to say, "We would give you work, but we cannot sell our goods." The same applies in a limited degree to any class of manufactures, whether of cotton or lace. One manufacturer might be willing to give such an amount of wages as that the workmen may have a decent share of the comforts of life, but supposing he cannot sell at a profit he will not employ them. One speaker advocated the establishment of boards of trade for the settlement of prices. Supposing that was done, and if sanctioned by legislative enactment, they may say, "We will not give less than a certain sum for a day's labour or for piece-work," but how were they to compel masters to give employment? I will take, for instance, my department of agriculture. Certain things, we know, are indispensable to be done—the ploughing and reaping must be done; but if prices of labour were fixed, the farmer may say, "It is all very well, but I will not give it." The work he contemplated doing may not be indispensable, and he resolves not to have it done. The manufacturer of cloth, likewise, may say, "I cannot give less than such and such a sum, because it is fixed by the Board of Trade;" but he may find, and no doubt constantly does find, that he cannot sell at a profit at that rate of wages, but that he could give employment at a less rate of wages, and it might be convenient to the operatives to take that instead of being out altogether; and therefore such a system would be injurious to both parties. I contend that it ought to be a matter for consideration, not so much whether a combination is at all legal, proper, or desirable, as the extent of coercion, restraint, or what other name you may call it, to which it should go. There is no set of men, perhaps, amongst whom there is a more modified combination than amongst farmers; but there are persons who feel it right to deviate from it, and I have deviated from it myself, by giving higher wages than my neighbours, because I wanted some extraordinary work done. I therefore maintain that combination is useful, if not carried to the extent of coercion in any way either by force of ridicule, or exclusion from society of others who think it right to take a different course.

Mr. W. Newton thought this question should be discussed on its practical bearing, as between the working man and the employer, if there were any of the latter present, and then those who were prepared to advocate the abstract question, would better rest their views upon the facts laid before them. He thought combinations were not objectionable, because they were necessary, and he would endeavour to give a few facts to show the necessity for them. He thought it quite impossible in the allotted space of 10 minutes to run from combinations to limited liability in partnership, and from that to the question whether legislative interference was called for. He would therefore confine his observations to the subject of combinations, and he would say that numbers of men were dealt with in factories, in a manner by employers which made combination a self-protecting process. Everything which an employer did in relation to the workmen, was done in the capacity of the master of the whole of them: he did not deal with the men individually—he would not reduce the wages of one or two men, and leave the rest alone, but he would give notice that on a certain day a reduction of 10, 15, or 20 per cent, would be made in the wages of all the hands at day-work; or if working by the piece, as weavers or cotton-spinners, a reduction of so much per piece or per pound in the article they manufactured. This reduction took place simultaneously. Supposing there was no combination, but that each man acted independently on the defensive against the employer he would not be allowed to speak. He would not say, "Jack, are you satisfied with this?" or "Bill, what's to be done now?" But the men naturally consulted each other; and probably, not being able to do so under the eye of the foreman or the employer, they went to the public-house and talked it over; and then they found the necessity of enlarging their co-operation, and met for that purpose in some hall or institute in the town, and a committee was appointed to carry out the instructions of the general body. How else could they do it? If the employer went to one man and said, "I will reduce you, because you are an indifferent workman; if you do not produce as much as another man, I shall take a penny per lb. off your wages," it would be for that man to deal with the employer individually; but when he spoke with one voice to the whole of the people employed, then it became necessary to combat his power, and to answer him with one voice, and, when united, both parties were upon

a perfectly equal footing The employer spoke with one voice, the employed must answer with one voice, and they were not equal till they combined to meet the employer on those grounds. He therefore contended that they were driven into combination, and not only were combinations necessary, but they had served to a great extent as provident institutions. It was known that these combinations had prevented strikes over and over again, and the employer had yielded what was asked for, because he knew the men had a fund to sustain themselves, and could stand out, and they had given what was required without strikes and without lock-outs, whereas they would not have given it had there been no combination. There could be no doubt that, and they were prepared to justify it not only upon their own wants, but upon the highest principles of political economy, high wages were beneficial to society. He had said that combinations had been to some extent provident institutions: he could speak as to the society of which he was a member, that, independently of the expenditure during the strike, merely for provident purposes, when the employers could not give employment, and when, for anything they knew, the men were turned upon the world penniless, the society of which he was a member, during a period of 5 years, gave benefit to members out of employment to the extent of something like £60,000, or at the rate of £20 per man per annum, during those 5 years. Therefore, he contended, no one could say that combinations were objectionable or injurious. Mr. Fort had said they were evils in this sense and the other sense, but he had not favoured them with a single fact to show what his assertions were based upon. Having stated the way in which combinations amongst working men arose, he was prepared to say they were valuable to working men, and, inasmuch as they composed the greater portion of the community, they were valuable to the community. They should not look at it as a class, but as a majority of the people; because if the working classes composed the great bulk of the community, whatever improved their condition improved the condition of society generally—and combinations had had that tendency. They enabled the working man to maintain a more independent position than if he had not combined. If he was not in combination he knew he had only his single influence to oppose against that of his employer. In trade societies a regular system of communication was established, and information was given where work was most plentiful—where it was best to go to get employment—and by that means the workmen assumed a defiant position against the reduction of wages; men felt the necessity of defiance in such cases, and they used combinations for that purpose.

Mr. John Pettitt, (House Painters' Society, London,) said,—Combinations were confessions of weakness; it was natural that the working man should be weak, by reason of his peculiar position: he was weak in the inefficiency of his education, and in the lack of time and opportunity to make up that inefficiency. It was notorious they were weak, by the inevitable circumstances in which, as it were, they were compelled to be each the antagonist of the other—rivals in labour, and rivals in search of that which was often difficult to obtain. Their weakness was not alone the result of poverty or lack of education; but also of the disastrous circumstances which compelled men who should be most closely linked together—men who should begin in the workshop that bond which should unite them,—to look upon each other, in times of scarcity of employment, speculating who would be discharged first. It was in the workshop or the mill that, too often, the first seeds of distrust were scattered. Combinations were not only objectionable, but difficult to carry out. Those who had studied the question on paper—who had only studied it theoretically, calmly, and dispassionately, knew nothing of the bitter feelings of a man when he learned that there was no further use for him on the next Monday. The position of the mendicant was envied by few, much less by the skilful mechanic; yet such they were when they were out of employment, and thrown upon the support which their fellow-operators gave but meagrely. Combinations were objectionable to the working man because they were seldom unanimous; nevertheless, in some instances they served as a protection, not only to the honest, industrious, and skilled workman against the tyranny of an overlooker, or the rapacity of a selfish employer, but they were valuable to some of those who considered the interests of the employer as a part of the case; as protective to the honest and moral manufacturer, who, finding the interest of his invested capital increased, was willing to risk the remainder of his capital, and willing also to share with the operative the profits of the increased interest he received from his investments. Combinations amongst workmen were a protection to the honest and well-meaning manufacturer when the workmen combined in refusing to work for employers who only gave the same scale of remuneration to the operatives as before, notwithstanding the increased price of every necessary of life, and notwithstanding the increased interest the manufacturer derived from his investments. Combinations, on the other hand, were objectionable, simply because there was no moral consideration in the operations of trade; if the moral question were permitted to enter into the arrangement between the employer and the employed, it would be easy to see who was in the right and who was in the wrong; but when the skilled mechanic, who had endured much in the acquisition of his skill, was treated like a dead commodity in the market, it was then the difficulty arose as to how he was to defend himself in a moral point of view. It was then that combinations became necessary; it was thus combinations had been and would continue to be the only resource of the working man—a lamentable resource, it might be, but the only one available so long as morality was to have no place in the transactions between the employers and the employed. If a man saw prices higher, and did not share in it, he had severe reflections when he found that all the benefit went into the employer's pocket, and none into his own. When the operative found that there was left to the employer a profit of 25 per cent. upon his commodities, after deducting cost of material and production, whilst 7 per cent. was considered a high rate of interest, taking every source from which capital could derive interest, the workmen naturally wished for a rise in wages, and to that end no other means were open but combination. Even then the operatives were in a lamentable position; even then they were not equal in power to the employer, because one will and one power must be superior to the will and power of an aggregate body.

Mr. Gillander (glass-maker, Birmingham), said, as yet the subject had not been treated in a practical manner. They had before them the fact, that thousands of their fellow operatives were locked out. They were asked, "are combinations detrimental to the community?" However the decision of that question by this conference might be, if he told those whom he represented that the opinion was against combinations, they would not take any notice of it, because they had had practical experience that combinations were beneficial. With regard to legislative interference in the matter, he was sorry to say the legislature had too much to do with it at the present time. In ninety-nine cases out of a hundred, in legal proceedings between the employers and the employed, the decision was against the latter, because the magistrates were of the class of the employers. (Order.) He thought it would be wise on the part of this conference to throw overboard these two points altogether; because, if combinations were in existence, and no force could put them down, and the working classes believed them to be good, and the masters acted upon the same principle, he contended that that was the best course. As for legislative

interference, the people of England would not allow the legislature to interfere, and the combination was so great that it could not be prevented. Their attention ought rather to be directed to the finding out some agency that would render the evils complained of unnecessary. He thought the alteration of the law of partnership would go to effect it. In the trade to which he belonged he would venture to say there would not be an employer in twenty years' time who had not been an operative; but at the present time there was not a working man who had the opportunity of putting a crucible into the furnace, and if a good pattern was introduced, if it did not originate with some one of influence, it was rejected; and owing to the existing law of partnership the trade to which he belonged was entirely in the hands of persons who were inferior to the working man in knowledge. He said, therefore, give the man of small capital the opportunity of joining with others similarly situated, and then there would be no combinations except to produce something of use and value, and not to stop working. He was always glad to see men rise in the world, but not to take 20 per cent. out of their operatives; and so long as that was done there would never be a proper feeling existing between the employer and the employed. Instead of being treated like men, if any complaint were made, however well founded, they were told "If you do not like it go about your business." Were men to be treated with less consideration than a dog? Those were the things that produced combinations and generated ill-feeling. On the part of those whom he represented he felt grateful to the Society of Arts for having called this conference. He felt it was one step in the right direction. It brought all classes together, and proved that the operative classes were not mere *hands* but *men*.

Mr. HUGHES (barrister, of Lincoln's-inn) said, in reference to the subject of limited liability in partnerships, all that previous speakers had been contending for could be obtained by Mr. Slaney's Industrial and Provident Societies Act, inasmuch, as under that Act, an individual could advance five times the amount of capital that was brought into a concern and be the trustee for the same, but the limited liability they could not have in the existing state of the law. He saw in the room persons belonging to societies which worked upon the footing of putting capital into a concern at 4 or 5 per cent. interest, and then the liability was limited to five times the amount advanced.

Mr. CUDDON (of Camden-town, cabinet maker,) could speak from experience that combinations, both of masters and men, were necessary. The result of that, in his own trade, was that a book of prices was agreed to; sometimes the book of prices did not apply, and then day-work was substituted. For the last quarter of a century he had been out of business, and in the retirement of private life he had time to reflect upon the bearings of this subject. For his own part he felt it impossible to do justice to the many important questions involved in this proposition: he would, therefore, confine himself to the question—"Are combinations objectionable?" He considered them objectionable, although necessary, because they were necessitated by what he considered to be a false and unjust system of trade—the competitive system—and, whilst that was countenanced, he considered combinations on both sides must be countenanced also. The proposition before the Conference, he submitted, contained a presumptive falsehood. If asked "Are combinations objectionable as a means of influencing the value of labour?" he would submit that no combination whatever could tend to influence the value of labour. The man who talked of this must have in his mind some definite value which he puts upon labour. He should like to know what that value was. Let any one who beheld the noble edifices which had been reared in this metropolis and in Paris—edifices stored with luxury and wealth—let any one put a value upon those, and if he could tell him the value of those, he would admit that he could also tell the value of labour. But he believed that was a question which no man could answer. He would give them an illustration which should not be far-fetched. On one occasion he gave sixteen guineas for an article which proved to be worth not more than as many shillings, although he purchased it of a respectable tradesman, who assured him it was worth £20—and that tradesman was an intimate acquaintance of his own—(a laugh)—indeed that it was worth more, but he would let him have it as a favour. (Renewed laughter.) Having shown his purchase to a person in the trade he assured him (Mr. Cuddon) that the men who produced that article were not paid more than £3 for it, and that to have done them justice they ought to have been paid £6 or £8, and yet the vendor of that article was paid £13 just for handing it over his counter, for which a shilling would have been ample, and he (Mr. Cuddon) was absolutely plundered out of sixteen guineas. (A laugh.)

The CHAIRMAN—I have a great notion of the value of time, and also of adhering to the subject under discussion. I must request the gentleman, before his few moments of sand are run out, to keep himself within the question.

Mr. CUDDON said he was upon the subject of the value of labour. If they put a value upon the labour according to the price they paid for an article, they would begin in error, and the conclusion would be in error also.

The CHAIRMAN would call attention to the fact that the first proposition had already been under discussion for two hours. There were two other propositions of equal interest and importance. Upon the first proposition there seemed to be very little difference of opinion, for only one person had held that combinations were objectionable, except under certain circumstances. He therefore hoped, that after the next speech, the conference would proceed to the consideration of the second proposition. He had seen a strong desire on the part of the representatives of the working classes to speak; but he would put it to them whether they would not best advance their own interests by hearing what the employers had to say.

Mr. LEIGH (Manchester boiler makers), thought the combinations at present carried out ought to be more clearly defined, and manufacturers should show that their combinations were more fair or just than those which were supported by the working men. First of all he would ask what were the reasons for combining? He would say the object was to support themselves and their families, to educate their children, and to maintain a position in society. The means to achieve that was wages—the working man's capital. It was seldom they found a working man with more capital than sufficed to serve him from week to week; and with respect to the tendency of combinations to influence the value of labour, he would say this—in his branch of business combinations had had some tendency to raise the value of labour 20 or 30 per cent. without injury to the capitalist. If there had been no combination, would his trade have been in the position it now was? He could say, certainly not. He had on several occasions been deputed to communicate with the employers on behalf of his fellow-workmen, and he could say for himself that he had never been met with contempt or overbearing. But there was one system of combination which the masters found fault with—that was, endeavouring to monopolise the trade. The principle of political economy, to which he thought every one would subscribe, was, that every man had a right to labour, in what he is qualified to do, and must live by his labour. He (Mr. Leigh) said so too, so long as he did it by honourable means. If one manufacturer employed 100 men, and at the same time there was a surplus of labour in the market, what the men would complain of was this—that the skilled hands should some of them be discharged, and incompetent persons introduced and placed by the side of skilled men to learn from them, so that the employer might have the advantage of reduced wages to the new hands. The working men must na-

turally cling together and ask, "what will be the result to us if these individuals are introduced?" The result would be a general reduction of wages, and that had been proved by experience. The result was, the operatives combined, for they would not work by the side of the men so introduced to learn from them. That was called an illegal combination—it was called conspiracy, and in many instances parties had been punished for so doing. But he would ask this—when a manufacturer went to the exchange to sell his commodities, if offered a fair price he would sell; if the price was below what he considered to be the real value of his goods, they were withdrawn from the market, and kept on hand till things took a more favourable turn. Had not the working man, upon the self-same principle, a right to refuse to sell his labour at a price below its real value. He (Mr. Leigh) said he had a perfect right to do so. The manufacturer might be able to keep his goods by him; he would not be necessitated to apply to the parish for relief for the support of those dependent upon him. But, he was sorry to say, there were thousands of cases, in which, if workmen were thrown out of employment, only for a month, they must either have recourse to the parochial funds, or appeal to their fellow workmen. The operative might be told "there is work for you;" yes, but it must be at reduced wages, and if he submitted to that reduction he would not be able to live as he had done, and must forego the education of his children. Workmen knew that they stood in an isolated position against the employer, and consequently they assisted to support each other. They said "rather than you shall be reduced I will share with you what I have got, because I know that in the event of your submitting to be reduced, a reduction will follow on my own part, and I think it wiser to make a small sacrifice now, when I can afford it, rather than be reduced to such a pitch that I cannot sacrifice anything. It had been said that employers had many things to contend with—such as providing new machinery, and losses from breakdowns; but notwithstanding all those things, it was never shown that an employer had sustained any material loss thereby. Was it ever known for a capitalist to publish a list of his profits? He remembered in 1847 one large firm in Manchester contemplated a reduction in wages, upon the plea that they had only realised £14,000 profits upon the previous years' transactions, whilst the earnings of the operatives employed in that establishdid not average 10s. a week each throughout that year. He considered that was a matter which ought to be looked at; let them look at the relation between the employer and the employed; let them see whether combinations had tended to improve wages; let them look at the combinations of the capitalists, and say whether they had done anything towards injuring their fellow-men. He contended that combinations had not injured the employers. If they had he should like to hear one of that class say so.

Mr. Edwin Hill (Inspector of Postage Stamps) rose and said,—I have had the pleasure of introducing many economical improvements in the use of certain machinery; and, in most cases, I have either obtained the original idea or valuable assistance from the working men, by listening to their suggestions, and encouraging them to state what they knew, feeling as I did that if I listened to the suggestions of twenty individuals, if I obtained one good hint, it was well worth the loss of time. I mention this to show that I have had some experience in this matter. I think the position and wishes of the Society of Arts have hardly been properly stated by those who have preceded me. It appears to me, endeavouring as I do to look at the thing separate from the disputes which exist—looking at it as a philosophical question—this is about the truth of it: it has been said it is difficult to judge of the value of labour; but, according to all authorities on political economy, that is determined by what Adam Smith calls the haggling of the market. Parties who have to buy labour try to get it as cheaply as they can—the efforts of one party being to push up, and that of the other to push down. We thus arrive at the price of the day. This is a painful position, for I very much dislike haggling of any kind; but hitherto no other way has been discovered of getting at the price of anything. For my own part, I believe if an umpire were called in between workman and employer, if he attempted to reconcile prices he would fail in doing so; and it would be found that they had not understood the matter, or rather that it was beyond the bounds of any man's understanding. With respect to combinations, we will suppose a combination on the part of the masters to settle what they will give for labour, and on the part of the men to settle at what rate they shall sell their labour. My opinion is, the true object they both aim at is the same. The line they would draw is the same, if drawn by the masters without reference to the men, and if drawn by the men without reference to the masters, because their interests are practically the same. Let us ask, first, what price the masters will settle—what price it is their interest to settle? It is not the interest of the masters to make their business so profitable as to invite competition on all sides, because such competition might be ruinous to them, and would be the greatest evil that could befall them. Therefore, I say, it is to the interest of the masters to pay a price that would yield a fair return for the capital, time, and care employed; but not so when they raise the profits to such an extent as to invite competition. But, supposing the workmen are asked to settle the prices. Is it to their interest to settle prices which would ruin the masters, or drive the business to other countries? Yet that is the result of too high prices: for in some other country the master may find that he can make more profitable use of his capital, and, if he does not go himself, the probability is that his son will. Therefore, if the masters had to settle prices without reference to the men, and the men had to do the same, without reference to the masters, if each understood their own interests they would both come to the same point—neither driving the business out of the country on the one hand, nor inviting undue competition, which would reduce the profits, on the other hand. The argument, then, stands thus,—a certain line is desired by both sides of the question, and yet they cannot find this line except by the haggling of the market. The object is to ascertain whether this painful operation is on the one hand rendered less painful—whether any plan can be imagined by which this line may be reached without the pain, and sorrow, and discomfort, and ruin, now incurred by thousands in the attempt to reach this line, which we ought to desire to agree upon. This question divides itself into two points, and I will take them briefly. My opinion is, that the state of the law has interfered most seriously and mischievously in the matter, and has rendered the process of finding the working prices ten times as painful as there is any need to be. The usury and combination laws have been abrogated, but habits have been engendered which will not readily die off; and there are many laws in existence at the present time which have the effect of aggravating the evil of the process both to masters and men. I believe this to be the case, although it may not meet the concurrence of all present. I believe the monetary laws have a great deal to do with it. I believe after prices have been regulated, the whole thing is unsettled by the varying value of money. If the value of a pound sterling is settled at one time, that value becomes afterwards altered, and it upsets the thing at once. I think, although this discussion may be productive of some good, it should be followed up by a commission of inquiry, similar to those which took place upon the Poor-Law and the Public Health Acts. That an investigation should be made by men suited to the purpose—practised in these matters; and who should be prepared to hear both sides of the question with impartiality, and draw conclusions from them, and lay them before the legislature, to know if anything can be done to serve both sides, and arrive at

a true result, in which, I am sure, we are all mutually interested.

Mr. NEWTON here suggested that, as there were many employers present, and as there appeared to be a great competition for speaking, it would be better to hear the arguments first on one side and then on the other, instead of four or five working men speaking consecutively.

Mr. MEDWIN, (master bookmaker, of London,) said—I think the suggestion of Mr. Newton a very proper one, although I should be very happy that a working man should take precedence of me. I have for twenty-four years been an employer of labour in London, and I occupy the relation of secretary to a society which was called into existence some nine months ago by a strike which took place against the employers; and I will endeavour to represent the views of that society, which are in accordance with my own. This is a very difficult question, and it will be for the Council of the Society of Arts to decide whether another opportunity cannot be afforded for its discussion. I think we know very little more about the question now than we did when we entered the room. We have only had expressions of opinions which were patent to the public previous to our meeting here to-day. There appears to be a misconception in the argument. One is that combinations exist principally for the defence of labour. I maintain that they exist for aggressive purposes upon capital; and I venture to say no person can read the history of strikes without arriving at that conclusion. I have myself experienced nine or ten strikes, and I pledge my word to this conference that on each occasion the strike was not made to guard against aggession on my part, but for the purpose of aggression against myself. Each time the strike was for a rise of wages. I therefore think it is a great fallacy which has been reiterated, that strikes are for the defence of oppressed labour; you will find that in the main they have been for aggression upon capital. I apprehend they attempt to do artificially that which cannot take place naturally. These things find their own level by a combination of circumstances altogether beyond the reach of either party to control. I think also the difference between the character of the articles manufactured may throw some light upon it. Some articles we cannot get elsewhere. I allude to the building of houses, &c.; the making of bricks; masonry work and painters' work. We cannot get a body of men from abroad who can come in competition with us in those branches of industry; and therefore by combination they can get almost any price they like to ask for their labour. But it is different with many other branches of trade, the produce of which have to go on the Continent for a market. It would be folly or any manufacturer at Preston to go on producing goods, when he finds on sending them into a foreign market that he is above the price which the market will produce, and that the foreign manufacturer can undersell him by 10 per cent. It is the same with many of the branches of trade in Birmingham, and in the trade to which I belong; they have to come into competition with foreign manufactures, and if we are compelled to give prices higher than will admit of our competing with the foreign manufacturer, the tendency is to shut up the trade at home. I apprehend that such a state of things had a material effect in closing the late strike of the engineers, through which we were brought into contact with the Belgian machinists. I think combinations to regulate the price of labour are injurious to all who enter into them. To be effective they must be accompanied with a great many other things. They must be attended with the adhesion of vast numbers who were unwilling to combine. To be effectual, combinations must tell upon the independence of men who dissent from the principles of combination; it compels a man to give up his subsistence, and throw himself upon a precarious fund. In my own trade I know that combination has done great evil, in not only compelling men to leave their employment, but sending them into strange districts, leaving their families to the support of the fund; to the selling of the last remnant of property; and then applying to the parish. I say, it takes a man into a position of temptation, and results in a system of coercion and compulsion.

Mr. ROBERT OWEN said he felt a deep interest in this question, having been a master for 40 years, employing from 500 to 3,000 operatives. He was very desirous of doing all he could during that period to ameliorate the condition of the operatives under him, because, in the situation which he held, he found that he was the tyrant, and the operatives were his slaves, to all intents and purposes. He did all he could for many years to diminish the condition of that slavery, but he found, after his utmost exertions in that direction, that they were still his slaves, and he was their tyrant. It was not the fault of the masters, nor was it the fault of the men, that these hostilities between them had constantly taken place. It was the false position in which both were placed: it was a position extremely injurious to the masters and highly disadvantageous to the men, and was also highly injurious to the country; and he hoped yet, old as he was, to see the time when there should be at least a commencement of the end to this tyranny and this slavery. They might sit there and discuss the subject till that time next year, and he was satisfied they would not come to any satisfactory result between masters and men so injuriously and so unwisely placed. He held in his hand a report which, after he had been 25 years a master, with 3,000 individuals under him, he was called upon to prepare by one of the largest associations in London, the chairman of which was the Archbishop of Canterbury. That commission was composed of the first statesmen, the first political economists, and the first manufacturers of the day. They were called upon to inquire how, under the then existing pressure of the times upon the working classes, they could devise measures for their relief. The report which he held in his hand was presented to that committee, who came to the conclusion that the subject was too large for them; but a committee of the House of Commons was then sitting upon the Poor-law, and he was requested to take the report to that committee, which was composed of 40 of the leading members of the House. He was directed to attend that committee, but the whole of the day was spent in the discussion as to whether he (Mr. Owen) should be examined or not. In the evening he was requested to attend again the next day; he attended accordingly, and the whole of that day was occupied in discussing the same question, and at the end of the second day it was decided by a small majority that he should not be examined. The condition of the country at that time was different to what it is now; there were then interests opposed to any improvement in the condition of the working classes. The improvements he had proposed were increased education and universal beneficial employment; and until the Government of this country should determine upon making arrangements for well-educating and well-employing every British subject, they would fail in their duty.

Mr. ANDERSON (of London, jeweller), said it happened to be his lot to belong to the labour class, who had neither store-house nor barn. He was connected with no trade society, but was intimately acquainted both with trades and associations. The observations which had fallen from several of the trades' delegates would lead this conference to believe that the whole working population were in favour of combinations to raise the value of labour. That was not the fact. He could say, a very large portion, and, from all he had heard and seen, the most intelligent portion of the working classes were against combination to raise the value of labour. They objected to it, because it was wrong in principle, because it was subversive of right and true liberty, and ought not to exist in a country where liberty was the basis of the constitution. Associations to promote the trade of a country could not

exist except under the control of the great representative body of the people; and combinations, either on the part of the employer or the employed, to extort a certain amount of labour for a certain value, was, in the opinion of those whom he represented, subversive of what was called true liberty. It was a pleasure to think that the labour class of the country—notwithstanding the many injuries they had suffered, had obtained throughout the civilized world a reputation not inferior to that of our arms by sea and land. The working classes were treated with respect and consideration by all ranks of the community above them: but there were evils connected with that class which he dared not deny, and which he said were unjustifiable; this he did not lay to the blame of any particular class of employers, but he thought it originated in a mistake on the part both of employers and workmen, and he did not find that there was a clear understanding on the subject. He maintained that the wages of labour were inadequate, but that did not justify combination to alter it. If they objected to combinations which would raise the price of articles, it was equally objectionable to combine on other matters, more especially those which placed themselves beyond the control of the law. The difficulty was in what manner were the people to combine to remedy the evil. They had seen combinations in this country for the purpose of abolishing slavery, and to emancipate the trade and commerce of the country from the oppression of laws which were thought to be injurious. He quite agreed with Mr. Slaney and Mr. Hill, that the power to remedy the evil did not lie in the hands either of the workmen or the employer—that there were laws in existence by which the evil was perpetuated, and without the alteration of which there was no power in any body of the community to alter the discrepancy between the value of labour and the value of the article produced. The labour population formed the great mass of the community, and those to whom they disposed of their labour were an inferior minority; but the parties disposing their labour to the employers had no use for the produce of their labour as far as they were individually concerned. The whole value of their labour depended upon the price which their productions would bring from the general public. The present laws shut out the labouring population from that great market for labour, and opened it only to the employers. The only means, he thought, whereby the labour class could find redress, was in their representatives in Parliament—so that the labour market might be thrown open to the labourer as well as to the capitalist.

Mr. Owen wished to explain that, when he used the expression "tyrants," as applied to employers, he meant to add that, under the existing state of things, the operatives put in the place of the masters would be tyrants also.

Mr. Read (baker, of London) begged to differ from the statement of Mr. Anderson, that a large portion, and the most intelligent portion, of the working classes were opposed to combinations. He (Mr. Read) had been often mixed up, as a trades' delegate, with all classes, and would assert that combination was the general rule amongst them. Combinations, he contended, were useful. It was combination and opposition in some shape that procured the signing of Magna Charta by King John, and from that day to the present the principle of combination had been more or less approved and acted upon. The working classes at the present time fancied—and he thought justly so—that they were oppressed, and that they had not sufficient to maintain themselves in that respectability in which those who produced the wealth of the country ought to do. Therefore, he said, combinations were necessary. Combination had added to the prosperity of the country, because they had tended to keep up the value of labour. Look at Ireland, where wages were low; the population had fled, capital was useless, and the soil was useless, for want of capital to cultivate it. His own opinion was, that limited liability in partnerships would not render combinations unnecessary at present. What might be the case bye-and-bye he was not prepared to say; but he thought it would be a great step towards the great end to come. That, of itself, might be said to be a combination of a set of men for the common good. He thought boards of trade would go a great way to remedy the present evils. He had had the honour of assisting for some time past in the consideration of the subject of boards of trade, and, with other delegates, had laid the matter before the Home Secretary. As to legislative interference, that was critical ground for which they had no precedent to give. The trade with which he was connected had had these matters under consideration for some weeks past, and they had come to the conclusion that with limited liability in partnerships, and the establishment of local boards of trade, composed of an equal number of employers and operatives, the present evils would in a great degree be remedied. It would rest with the boards of trade to arrange the prices of labour, and to fix the standard of time for labour. In his own trade there was no standard of labour, but it depended entirely upon the will and caprice of the master; and if masters and men understood their own interests better, that, unquestionably, would not prevail. They would have a better state of things, and society in general would become more prosperous in proportion as the mutual interests of the employer and the employed became recognised and brought into action.

Mr. Turner (Manchester Stonemasons' Society), contended that combinations were not objectionable, and he denied that the more intelligent of the working classes were opposed to them. Look in what direction he would in society, he saw combination all around him. It was said that they were resorted to in order to raise wages; that might be the case to a certain extent, but not exclusively so. Combinations were, more frequently than not, entered into to defend their rights. During the past summer his trade had only made one strike, and that a very small one, in order to raise wages. The employers had risen the wages, and he was happy to say they were upon better terms with each other than used to be the case. The working classes had often been forced into combination; and he had listened with great pleasure to the able remarks of Mr. Newton on that subject. If there had been no combinations amongst the body of the masons, they would not have possessed many of the privileges which they now enjoyed, not the least of which was the cessation from labour at 4 o'clock on Saturdays, and there was no falling out with the respectable employers upon that question. He wished it to be understood that they were not seeking to raise wages so much as to elevate their position; and amongst the many benefits which had been derived from combination a provision in case of accident or sickness ought not to be lost sight of. He should not have obtruded himself upon the attention of the conference except that he could not allow the statement that, strikes were made almost invariably to raise wages, to go forth without contradiction, as he could bear testimony that, in many cases, that course had been resorted to solely for the purpose of protecting the rights which they enjoyed.

Mr. Henderson (of the firm of Fox, Henderson, and Co.), said—although I can add nothing to the information which has been given on the subject before this conference, yet, having attended here, I feel a desire to say a few words, and to express my wish, as an employer, that the antagonism which has too long existed between master and man may be put an end to, and that we may come to an understanding upon that which is an admitted fact on all hands—namely that the interests of the working classes and those of the employers, are, if rightly understood, identical. I quite agree with Mr. Owen, however, that we are so much at sea, that I have very slight hopes of much good being done by this conference. On looking over this first proposition, I think the wording of it is not

such as the Council would adopt upon a reconsideration of the subject, for instance—combinations—"Are they objectionable, whether set on foot by employers or employed, as a means of influencing the value of labour." My answer to that would be, that combinations, whether by masters or men, cannot influence the value of labour. They cannot do it. We must go back to the ruling principle of supply and demand. Masters may combine, and for a few months, perhaps, may get labour at a lower price. The workmen may combine, and, for a little time, get higher wages, but, in the end, it must come to its level; the result of a strike for any length of time being—the men are brought to misery, whilst the capital of the masters is lying idle, and their plant and materials damaged; but the monster mischief that is done all that time is, instead of the masters and the men being brought nearer together, they are put further apart. For my own part, I think there are many grounds on which a combination on the part of the workmen is justifiable. When I say justifiable, I mean that I could excuse it; because I am bound to admit that the workmen are put in a disadvantageous position as regards the employer; and if they combine together to strike, they may be to a great extent excused for it. But whilst I may excuse it on the part of the working classes, I can form no excuse for a similar combination on the part of the employers, because they have it all their own way, and have it in their power to inflict an enormous amount of injury, and cannot do it without inflicting it upon those who are not guilty, and are not parties to the strike. If the matter of strikes amongst trades' unions could be investigated, I believe it would be found that the majority of the working men are opposed to strikes, but have joined in them because of ridicule, and the fear of expulsion from the society of their fellows, and that has been the most mischievous part of the recent strikes. I can bear the testimony of my own experience, that things are now much better conducted then they used to be; and I am here to-day feeling that this is a step in the right direction. I think we have lost sight of that which was so well stated by Mr. Slaney at the outset,—that before we talk about the effects of combinations, we ought to satisfy ourselves as to what is the cause of them; and since we, as employers, are ready to subscribe to the principle—that the interests of the masters and the men are identical how is it that, giving adhesion to that opinion, something cannot be done to go to the root of the matter, and ascertain where the evil exists? Speaking of the question of limited liability in partnerships, I concur in the opinion which has been so generally expressed,—that an alteration of the law in that respect would be immensely beneficial to the working classes, and would, by degrees, bring about a better state of things; but I cannot see that this has any immediate bearing upon the question of combinations; and as to the notion about privacy of affairs, we know that in railways and other joint stock companies the system of limited liability is carried out; and if we had a limited liability in partnerships, I have no doubt the ingenuity of persons who are acquainted with the subject would be able to bring it into working, so as to be ultimately beneficial.

Mr. Lloyd Jones (of London) remarked that the last speaker had put a question which ought to be answered—viz: how was it that, whilst they acknowledged the interest of the employer and the employed to be identical, they could not agree better together? That was an important question, and upon that they could justify combinations in a better way than in relation to any other point which had been started. In the trade to which he (Mr. Jones) belonged, there were amongst the masters as well as amongst the men, persons who were anxious to get on—anxious to make money, without for a moment reflecting who might suffer. Amongst the masters they would find some man or some firm anxious to displace other men in the market, offering the article at a lower price than it can be produced at the standard price of labour,—having perhaps taken advantage of the surplus in the labour market. He believed the employers would give good wages if they could do it with safety to themselves, and preserve their standing in the markets. If they had men who were anxious to get on, and who were not over-scrupulous as to the means by which they accomplished their objects, how was the fair manufacturer to meet and prevent him from injuriously acting upon the price of labour? He would say to the working man, "by combinations amongst yourselves;" and he would say to both parties, "by submitting all between you to the decision of reason, and not to the decision of force." He (Mr. Jones) was extremely pleased to see Mr. Henderson appear before this Conference; for it was a lamentable thing that the employers did not more generally come forward on an occasion like this, to show that they were willing to submit their case to a reasonable tribunal, and remove it for ever from the dominion of force. If a solitary case of dispute, which might arise in any of the manufacturing towns, could be submitted at once to arbitration, it would prevent its spreading amongst all the people connected with the trade in the same place. Therefore a reasonable arbitration might prevent all those frightful results which had ensued. He, however, was not disposed to believe what had been stated by some of the speakers as to combinations not enhancing the price of labour. Practically, they did enhance the price of labour, and they found that the trades in combination always obtained higher wages than trades out of combination. It was true they might say, that in the abstract combinations were an injustice. When the employer was reduced to a contention for prices—when the matter had, as it were, to be settled by a scramble, how could they object to the working man uniting to demand that which might not be strictly just, taken in an abstract view. Some would say "leave the thing to the haggling of the market;" but there was not a single thing taken into the market in which there were not speculations with a view to enhance the price. They constantly saw, that when prices ranged low, the holders of certain commodities withdraw them from the market until prices ruled higher. What were the trades' unions doing? they were supporting men out of work. They thereby lessened the supply of labour in the market; and when all interests were contending for their own advantage, the working man was justified in this course equally with the employer. But he would say to the workmen, "let your union be for the purpose of resisting undue oppression;" and to the employers he would say, "treat them as men—talk with them as men—reason with them as men;" and then, whenever the two classes met together, they would come to more reasonable and more just conclusions than if they met as parties antagonistic to each other.

The Chairman—Since my name has been announced as presiding over this conference, I have received several communications from persons in the country, stating their inability to attend here to-day; and as it is highly desirable that we should avail ourselves of any new light that can be thrown upon the subject, I will now request the Secretary to read a letter which has been received from Mr. William Knott, of Sunderland.

The Secretary then read the following letter:—

My Lord,—As one of the chairmen of the Sunderland Ship-builders and Shipwrights' Court of Arbitration, I have been invited to attend the conference to be held in London under the presidency of your lordship, on the capital and labour question. I regret my inability to be present on such an interesting occasion, but believing it to be the duty of every one to assist in the benevolent object contemplated by the Society of Arts, viz., to avoid the recurrence of these unhappy differences between employers and employed, so often witnessed of late in this country, I beg to forward an outline of the origin, objects, and

working of the institution existing here for settling disputes between workmen and their employers, with which I have the honour to be connected.

This mode of arranging differences in trade originated in a desire on the part of the ship-builders and the more intelligent of the workmen, to have some impartial tribunal at which to discuss, and, if possible, to decide any disputes between them, so that strikes, so injurious in their effects to the interests of both parties, and the fertile source of so much bitterness and ill-feeling, might be entirely avoided. To this end meetings of the masters and men were held, resulting in the formation of the Court of Arbitration, an abstract of its rules being as follows:—

"That all disputes between the Sunderland ship-builders and shipwrights be referred to the Court of Arbitration for amicable adjustment, without the intervention of strikes or interruption to business.

"That nine members of the Ship-builders' Society, and nine members of the Shipwrights' Union compose this Court, to discuss questions brought before it.

"That three chairmen, unconnected with the trade, be appointed to preside in rotation, each chairman, when necessary to a decision, to have a casting vote, it being competent, however, for either party to appeal to the three chairmen, whose decision shall be final.

"That the Court be open to the reporters of the press and members of the trade."

The Court was established in January, 1853, Alderman Mordey, surgeon, a magistrate of the borough, Edward Backhouse, Esq., banker, and myself, a smith, being selected as chairmen, and during the twelve months of its existence several disputes between the parties represented in it have been settled in a friendly, and, I believe, satisfactory manner. The shipwrights of the port number about 2,000, and are as respectable and orderly a body of mechanics as are to be found in her Majesty's dominions.

It will be seen that a strong resemblance exists between the Arbitration Court and the "Conseils de Prud-hommes" in France, with this important difference, however, that whereas the decisions of the French tribunals possess the force of law, those of the English one depend for validity upon the voluntary submission of those coming before it.

The chief value, however, of the Court of Arbitration is not so much that it possesses the power of deciding disputed matters, as that it is a medium of bringing together in a friendly conference those whom it is so desirable, for their own interests and for the public weal, should co-operate together in peace and mutual good feeling. It is impossible for any one who has been present at the meetings of the Court not to be struck with its beneficial tendency in promoting harmony and mutual respect. Although an aggrieved party possesses the power of appeal, this power has never, as yet, been had recourse to, nor indeed has it been necessary for the Chairman to give a decision hitherto, excepting in one particular instance, when, although such decision was not satisfactory to either side, yet it was obeyed. The discussions, conducted in a respectful and kindly spirit, have produced cordiality, compromise, and mutual agreement.

The establishment and working of the Arbitration Court indicate a more reasonable frame of mind on the part of workmen and employers than is to be met with in the melancholy history of trade disputes. Many instances might be given in connection with it presenting a marked contrast to the feelings formerly prevailing. In particular, in the autumn of last year, an application was made by the shipwrights for an advance of wages, which, from the briskness of trade, might have been successful if persisted in, yet from a representation made by one of the most influential masters, and from the fact that several contracts had been entered into on the then existing scale, they were induced to postpone such application. In an instance, also, where the men pressed a certain claim, founded, as they believed, on the usage of the trade, but which, on examination before the Arbitration Court, there was not sufficient evidence to prove such—the men at once withdrew their claim. It must be borne in mind, that matters of minor import are not generally brought within its jurisdiction, but are arranged, if possible, between the parties differing.

Such, my Lord, is a brief account of an institution with which I deem it a high honour to be associated, and which, I hope, will be imitated with similar beneficial results in every manufacturing town in the kingdom. It would, certainly, be premature for the short time it has been in existence to speculate at all upon the permanent character of such a tribunal. But, should any act of the masters or workmen here terminate its existence to-morrow, my opinion would remain unchanged as to the superiority of such a method of settling trade disputes over the vicious system of strikes, ever producing, as they do, feelings of hatred and bitterness, inflaming the worst passions of our nature, and too often ending in calamity and dissapointment to all concerned in them.—I have the honour to be, my Lord, your Lordship's humble servant,

(Signed)

WILLIAM KNOTT.

Sunderland, January 27th, 1854.

To the Right Hon. Lord Robert Grosvenor.

Mr. Le Neve Foster (the Secretary) said, I may be allowed to state that William Knott is, as I am informed, a self-taught and self-teaching man, a working smith, who has made himself master of several of the classical and modern languages, and is, besides, a good mathematician.

Mr. Hindley, M.P., said—I must join in the regret which has been expressed by the gentleman opposite that there are not on this occasion a greater number of employers present. If I judge by the appearance of the meeting, and from the number of working men who have taken part in this discussion, I take it for granted that the majority are representatives of trades' unions, and I must say that I think their case has been fairly laid before this conference. I should have been glad if gentlemen like Mr. Henderson had come forward to state their opinion as employers. For my own part I shall not assume the character of a representative of capital, for I have rather attended here to-day in the capacity of a Member of Parliament, and as one who has been invited to this conference. But you will permit me to make one or two observations, which I think the employers would make if they were, and which would perhaps have some weight coming from them. I do not know that there is at the present time that objection on the part of the employers to combinations which there once was; the great objection is to the mode in which occasionally they are conducted; and if I could urge upon the workpeople, as their friend, one thing more than another, it would be to avoid everything that was objectionable in the character and style of their combinations. That the working people have a right to combine to raise the rate of wages no one can dispute; but that others should unwillingly be compelled to subscribe to combinations, is a tyranny whether on the part of working people or employers. I would advise you that in all things you take care to have regard to principle, and then you will have the best portion of society on your side. With respect to myself, as so much of this discussion has turned upon general principles—whilst my heart is with you, my understanding cannot subscribe to some of the assertions which have been made to-day; and whilst so much has been said of general principles, let me give you my history in reference to the practical part of combinations. The combination laws, as you are aware, were repealed in 1825. I was a young man then, and was just about commencing my career of manufacturing industry. I was told that the men, having an immense power, were about entering into combination, and that it was necessary for us, as employers, to do the same. I attended two meetings of the masters, and was disgusted with the tone that was assumed towards the operatives.

One person, with more warmth than discretion, declared that (to use a Lancashire expression) he would "punce" the man down the steps, if he said anything offensive to him; whilst another person was so timid about the matter, that he could scarcely call his soul his own. I reasoned within myself that I was called upon to join either a tyrant or a coward. "No," I exclaimed, "I will manage my men and manage my mill after my own fashion." I was at that time of day a strict political economist. We have heard the observations of Professor Pryme on that subject; but I will engage to say, he was not half so wedded to the doctrine of political economy as I was myself, at the period I am speaking of. Well, I managed my men and my mill. I said to my work-people, "I will not join the masters if you will not join the men. We maintained a neutral position, and we went on so for several years; and then I thought it necessary to make an alteration in the price paid for labour in the concern in which I was engaged, and the basis of that altera tion would be, that the work people would get some 25 per cent. more than persons of a similar calling in other places; and yet it was, in point of money, less per piece than other employers were paying. Surely, I thought, this could not be objected to by my work people. But I found there was another power which I had to consider—it was not my work people dealing with me—that I could have managed very well; but another power was brought into the field, and some other manufacturers, not giving the same advgtages as myself, met, and passed the following resolution:—

"We, the undersigned manufacturers by power, think it necessray to declare, in consequence of learning that in two or three establishments, a notice has been given to the workpeople of a further reduction of wages, that such a proceeding is in our opinion highly inexpedient in the present circumstances of the trade, and that we shall very unwillingly become parties to it."

That finished my political economy career. (A laugh.)—"No," said I, "if I have been able to manage my people and my mill for years upon my own system, and now other people are to step in to fix the prices I shall pay for my labour, I'll give it up:" and ever since I have been friendly to the combinations amongst the workmen. The gentleman opposite (Mr. Hill) has put a serious question to us. I think the majority of a trade ought to govern. I rely upon the principles of integrity which, for the most part, govern majorities, and if the masters would take the majority of the combinations—deal with them—argue with them—they would soon put an end to the system which the minority seek to impose upon the community. I cannot sit down without endeavouring to disabuse your minds of this—that capital and labour have anything to do with this question. It is not the antagonism of capital and labour. The Preston strike would be settled to-morrow if the Preston masters would agree to give the wages which other people are giving. It is not a question between the operatives of Preston and the operatives of Manchester, but it is a question between the capitalists of Burnley and the capitalists of Preston. The Preston operatives are placed in a fix: they are as much the creatures of circumstances as it is possible to be. But the *Times* newspaper says it is the fault of a number of agitators. This is the first time I have had the pleasure of meeting Mr. Cowell, but I say he is only the feather that is thrown up to see which way the wind blows, and it is false to say the feather was driving the wind before it; and I say, upon the whole, considering all the circumstances, Mr. Cowell has acted in a manner highly creditable to his character.

Mr. DUNNING (Bookbinders' Society) said it was self-evident that combinations were justifiable. The workman single-handed had no chance against the employer, and therefore he combined with his fellow-workmen in a common object; but it would be a mistake to suppose that because they combined to defend themselves against acts of oppression, that they could thereby control the wages of labour.

Mr. MCNAUGHTON DICKIE (Rational Reformers' Confederation) said the association he represented were favourable to combinations, although, generally speaking, he believed they were inoperative to raise wages. The experience of every-day life proved an opposite to the assertion, that the interests of the employer and the employed were identical. He utterly denied that proposition, as it was the interest of the masters to get labour for the lowest possible price, and that of the men to get as much for their labour as possible. He contended that there ought to be no masters in the present day, and that the men of Preston now on strike ought to become the owners of the mills, which he believed they might do under the system of limited liability in partnerships.

The CHAIRMAN—I think the time has now arrived when we may pass from the first to the second proposition on the paper, upon which I think no man can speak with better knowledge of the subject than Mr. Cowell possesses. By the fourth regulation of the order of proceeding, no resolution will be put except where unanimity prevails. I have listened attentively to the arguments, and whilst there are some points on which a difference of opinion exists, yet I believe there is but one opinion in this Conference as to the desirableness of a law of limited liability in partnerships. I will, therefore, propose that the sense of the Conference should be taken upon that.

The proposition, on being put from the chair, was unanimously assented to.

The SECRETARY then read the second proposition, which was as follows:—"Strikes and lock-outs.—Should partial strikes, intended to take the masters of a locality in detail, be met by lock-outs? What other means are likely to be effectual in terminating them."

Mr. COWELL (weaver, &c., of Preston) said, I have been called upon to give my opinion to this meeting in reference to strikes and lock-outs. As one who has had a great deal of experience in reference to a great strike, I must say that it has been attended by a great deal of suffering and privation to the operatives of the town which I represent, and, in my opinion, every step and every means in order to bring this unfortunate dispute to an amicable settlement, ought to be resorted to by all who have any sympathy with suffering humanity. I don't know whether it would be necessary for me to enter at any length into the cause of the strike at Preston, and also the lock-outs. These things have appeared in the public newspapers time after time; but there is one part of this proposition upon which I will offer a few observations in reference to bringing this unfortunate dispute at Preston to an amicable settlement. The question proposed is—"Should partial strikes, intended to take the masters of a locality in detail, be met by lock-outs? What other means are likely to be effectual in terminating them?" Now, as far as Preston is concerned, I may say it never was our intention to take the masters in detail, simply because the great majority of them had given what we wanted; there was no necessity to take them in detail, because they have complied with our requests. So far, therefore, I say the masters have taken the working classes in detail in order to starve them into compliance. The next question is, "what other means are likely to be effectual in terminating strikes and lock-outs?" For my own part I see no means likely for a considerable length of time to bring this affair at Preston to a close excepting by one of three means.—First, that the masters should be prepared to meet an equal number of operatives, in order to discuss the question calmly with a view to an amicable settlement. Secondly, that the affair should be submitted to arbitration—each party having power to chose an equal number of arbitrators, with a qualified gentleman to act as umpire. Either of these two proposals being acted upon would, I think bring this unfortunate affair to a close—not only in Preston, but wherever a similar case may transpire in the present competitive state of society. Another way is—for the masters to tell the men what they really want. We have asked the masters of Preston

to make proposals, but they have refused to do so. I don't know that it is necessary for me to say more upon the subject. All I can say is, local boards of arbitration would in my opinion answer all that is required, in bringing disputes between workmen and masters to an amicable settlement.

Mr. John Bowman (Preston Power Loom-Weavers' Association) was of opinion that circumstances should very materially decide whether strikes, even if intended to take the masters of a locality in detail, should be met by a general lock-out. Circumstances might render it necessary for manufacturers to close their establishments; but at the same time there might be circumstances which would render such a proceeding unjust and prejudicial to the interests of all parties. His friend Cowell had stated, that overtures had been made to the masters in Preston, and he was glad that the secretary of the Masters' Association had honoured them with his presence that day; for he felt confident that if a little more courtesy and consideration had been shown to the operatives, the disputes would have been ere this arranged. He took the opportunity of saying this in the presence of the secretary of the Masters' Association; inasmuch, as they had never had the opportunity of meeting the members of it. He trusted this conference would have the effect of inducing the masters to meet the men. Mr. Ainsworth would bear him out, that a letter was sent to the masters before the mills were closed, and his (Mr. Bowman's) name was appended amongst others to that letter. The reply to it was, that the masters objected to any interference on the part of the men. He could not say more, except to add, that he believed combinations were, at all times, necessary for the well-being both of the employers and the employed. He would add his testimony to that of Mr. Cowell, that there was no disposition to take the masters in detail in Preston; and in his opinion, the proceedings of the masters in that town had been unwise, uncalled for, and unjust.

Mr. Fort said he should be sorry that this conference should close without coming to some resolution on the subject of strikes. The remarks that had been made that day tended to fortify the notion that wages could be raised by means of combination. He believed that doctrine to be perfectly illusory. The amount of capital for wages was an inexpandible commodity. The practical deduction, therefore, was, that if by means of combination one section of the working community obtained higher wages, that portion which was not in union must suffer a depreciation of their wages. The result was, that if one class of operatives obtained ten per cent. more wages, the others would have to pay ten per cent. more for all the articles consumed.

Mr. Brown (Trades' Guardian Association, Liverpool) next addressed the conference. He said the association which he represented numbered between 30,000 and 40,000 members, and to a man they were opposed to strikes; and their object was, if possible, to prevent strikes. Whenever a dispute arose between masters and men, the Trades' Guardian Association took cognizance of the fact, and endeavoured to arbitrate between the parties; and he was happy to say, they were, for the most part, successful. About three years ago a dispute arose between the masters and the workmen; the latter complained of the heavy hours of labour, and being compelled to work part of Sundays. The matter was taken up by the Trades' Guardian Society, and the result of their mediation was the hours of labour were lessened, the Sunday work was discontinued, and the wages of the men were raised from 20s. to 24s. per week. A curious circumstance occurred a short time ago in Liverpool. The shipwrights came to a resolution to alter the regulations under which the men had been accustomed to work; the wages at that time were 4s. 6d. per day. A great demand, however, arose for labour in that department, and wages rose to 5s. 6d., from that to 7s. 6d., and ultimately to 15s. per day which high rate continued for several months. He submitted that the strike and lock-outs at Preston had produced a most injurious effect, and he regretted that there were not more employers present to make their statements in answer to the arguments of the trades' delegates. What was he to say to the body which he represented? He must tell them that the operatives of Preston came to state their case, but the employers did not come to state theirs; and he for one should go away from that conference, with a decided impression that the masters of Preston were wrong in the course they had adopted.

Mr. Caleb Wright (manufacturer, Tyldesley), said, he had attended this conference by invitation, but not in the character of a representative of the manufacturers of the north. The last speaker had incontestibly shown that the price of labour was dependent upon demand and supply; and, notwithstanding the present system of education, he believed they would constantly have these misunderstandings between masters and men. But they had to deal with the fact that this great strike had taken place, and to consider how so serious an evil was to be avoided for the future. If rationally managed, he saw no objections to combinations; and as the price of labour was governed by demand and supply, if the manufacturers of Preston were paying 10 or 15 per cent. less wages than those in Manchester, or Bolton, or Blackburn, why not draft off a hundred spinners to either of those places.

Mr. Aitkin said, perhaps a few simple facts in refere ce to this matter would show the meeting that a general lock-out was not justifiable, in consequence of individual townships intending to take the masters in detail. Take the town in which he lived, Ashton-under-Lyne. In 1848 the spinners and weavers came to the conclusion to endeavour to get the whole of the masters to pay a uniform rate of wages. Upon enquiry they found there was a disparity in the wages of from 15 to 20 per cent. To such masters as were paying below the average rate, they wrote a respectful address, in order to induce them to pay the same as their neighbours. They said they would do nothing of the kind, and the operatives combined to make up the difference to those who were paid at a lower rate than themselves; and the masters, seeing they were about to be beaten, shut up their mills for a month. He (Mr. Aitkin) would say that, in order to compete successfully, every master ought to pay as nearly as possible the same amount of wages for the same goods. Take, for instance, 36-yarns. Supposing there is a certain price for that in the labour market, could there be a fair competition in that commodity when one manufacturer was paying 20 per cent. less for labour than another? Had they been allowed to discuss the origin of strikes, he could have shown the meeting that in ninety-nine cases out of a hundred the fault had been with the employers and not with the workmen. It was all very well for gentlemen to say, "If wages are twenty per cent. higher at Manchester and Blackburn than at Preston, why don't you go there?" But if they went there and were not wanted, what were they to do? There were a great many things in political economy which looked well on paper, but which were miserable in practice. Supposing the operative classes were so numerous that they could not live by their labour, were the masters to receive their tens of thousands per annum, whilst the poor operatives could scarcely get bread? That was a question for political economists to answer! Therefore, he said, so far as partial strikes were concerned, they ought not to be met with general lock-outs. What were the means for putting an end to this state of things? He saw no other than by submitting the matters to some board of arbitration. That had been continually urged in the Manchester press, but the advances to that end had been met with contempt. He urged them to exertions in their individual localities. They wanted practical men to decide these questions. What did the Society of Arts know about 36-yarns? Those who

upon them and those who had to pay for them were the best judges in the matter; and it was incumbent upon the masters to treat their workpeople more kindly and respectfully, for they had as great an interest in the prosperity of manufacturers as the masters themselves. But whilst they were debating these matters, strikes were going on, misery was increasing, pauperism was increasing, and crime was stalking through the land.

Mr. PARE (Irish Engineering Company, Dublin) was in hopes they should have been favoured with a few more particulars relative to the strike at Preston, in order that they might form an opinion who was right and who was wrong. He was satisfied that if some arrangement could be come to, by which the working people could participate in the profits of business, these lamentable disputes would be put an end to; and he felt sure that if such a system were introduced into his own works, at least 20 per cent. more work would be done, and the profits increased both to master and man; he believed that would be, in a great degree, effected by an alteration in the law of partnership. They also wanted a better education for the working classes, to render them fit to become partners, and a more rational and uniform monetary system than now prevailed. To prove that establishments could be conducted on the principle he had stated, he need only allude to the fact that one of the largest—perhaps the largest—establishment in the city of London was now working on that system, as was also the case in Cornwall, and with the whale fisheries. Mr. Pare also expressed himself in favour of local boards of trade.

Mr. AINSWORTH (Secretary to the Masters' Association in Preston) said, he had not attended for the purpose of taking any part in this debate, but he did not wish his silence to be construed as being at all disrespectful either to the noble lord in the chair or the meeting. He had naturally taken great interest in the question on which they had been called together, but must be excused (although called upon by one of the delegates to do so) from giving any opinion with regard to it. He left the masters to defend themselves.

After a few words from Mr. Sturgeon in favour of general unions throughout the country,

Mr. NEWTON said he was anxious that this discussion should result in some definite resolution. He thought the conference would have but one opinion as to lock-outs being injurious. He thought the counterpart of lock-outs was where men struck in consequence of other members of their trade having struck where they had a complaint—that was, if a strike took place amongst the engine-drivers of the London and North-Western Railway, the two parties would be allowed to settle the affair between themselves; but if, in consequence of the strike of the London and North-Western drivers all the drivers on the other lines in the kingdom joined in the strike, because the London and North-Western men could not get what they required, that would be a parallel to the lock-out by the employers. The fact was, the men who were locked out had made no complaints; they were working comfortably enough together, but there were some employers who did not give the same rate of wages as other manufacturers, and their workmen struck, and the others were thrown out of work in consequence. If the workmen had done so he was sure it would be censured by that conference—the press would be the first to cry out against the workmen. What would be their feelings if the whole traffic of the country was stopped because the engine-drivers on the Blackwall Railway had struck? Such conduct would be intolerable, and Parliament would be called on to interfere, but the employers were carrying out precisely the same system by these lock-outs. He contended that it was an act of injustice that those parties who had no complaint, and who made no complaint, should be prevented from exercising their labour for their support. He knew the masters had the power to do so; but this proposition asked the question whether they ought to do so? He said not. The next question was, by what means this state of things might be terminated. One great means was, that the employers should treat the men as human beings; that they should have a higher consideration than as so much labour, to be bought and sold like any other commodity. They had heard a good deal about supply and demand, but they might talk till doomsday, and they would never make men contented in poverty, for poverty would always breed discontent. Education made the working classes more impatient of wrong; and an educated man would still resist wrong. Look at the strikes—where did they take place? Not amongst the ignorant agricultural labourers, but amongst the most intelligent and best educated of the working classes: and they stood there that day fit to be compared with those who were their superiors in station; and if education were wanted, it was wanted as much amongst the masters as amongst the men. The education the working classes required was to use their power to make themselves independent of the relationship which now existed between labour and capital. The capitalist had rendered labour subordinate to himself, and it had no more power than any other marketable commodity. The manufacturer did not tell the cotton-broker at Liverpool that he had taken a contract, for if he heard of it he would be likely to charge a higher price for the material, and the thing would be passed over as a pure matter of business; but if the workmen knew the manufacturer had taken a contract, and if they took advantage of it to demand higher wages, the employers would immediately raise the cry of "injustice." But, on the other hand, if the workman went to the master, cap in hand, and hardly daring to raise his eyes from the ground—if he said he should like a little more wage, as Mr. Hindley had stated, the master would perhaps "punce" him out. Those were facts, whether palatable or not. It was no use for the men to talk differently in that room to what they did in the workshop. Their feelings were not hostile to men of capital; they knew its use and value; but they said this—capitalists had not used their capital to the interests of the workpeople; and if there were a bond to cement society, it must be in the efforts men made to benefit others as well as themselves. He could not conceive a more hopeless condition, notwithstanding this country was the emporium of the world, than where every spirit of sacrifice for the common good was buried in commercial considerations, or smothered in profit and loss.

Mr. SAMUEL KIDD felt that the question they were discussing was the most important one of the age, and one on which the future independence of England as a nation must hang. It was a question on which the happiness of the great majority of the people rested. There was one fact worthy of notice. The *Times* of 17th December, last year, stated, that on Wednesday a deputation of masters went to Fairfield, and had an interview with the operatives of Stockport. Here they had the fact of an interview, the result of which was an amicable settlement of differences. Why was that? Because the two parties met reasonably. He held that the masters were dependent on the men, and the men on the masteers; each upon the other. The letter of Mr. Knott, which informed them that strikes were unnecessary, because they had a local court of arbitration, comported with the statement of the delegate from Liverpool, and proved, that where they had reasoning on matters of difference, an amicable settlement was generally arrived at. John Stuart Mill had stated that political economists were not agreed upon the fundamental principles of their own science, but that each started a theory of his own, irrespective of his predecessor; therefore, it was not a settled science. He was struck by the remarks of Mr. Jones upon this subject. Old as the hills, there were some employers who would over-bid and under-bid others; and he (Mr. Kidd) recollected the speech of William Pitt, in which he said, "the day will come in England when any one man will have

it in his power to reduce wages in a district, and other manufacturers must follow in their turn." For the last 60 years manufacturers had been underselling each other, and good men had reduced their wages, not because they wished it, but because they were necessitated to do it, owing to unrestricted competition. He (Mr. Kidd) was in favour of courts of arbitration; he did not think they would prevent all strikes, but they would have a great tendency to check them. The law did not put a stop to crime, but it gave a check to wrong, and encouragement to that which was right; counsel acted upon the willing, law upon the unwilling.

The CHAIRMAN here called attention to the lateness of the hour (5 o'clock), and expressed a hope that those who wished to address the conference would not do so unless they could throw some new light upon the subject.

A GENTLEMAN inquired whether the discussion would be adjourned?

The CHAIRMAN said he had been told there were circumstances which rendered an adjournment impossible. He should be sorry that any one should be left unheard; but for his own part it was impossible he could attend any adjourned discussion, as his parliamentary duties commenced on the morrow.

Mr. DICKEY said he should protest against the proceedings of the Conference, and handed in his protest accordingly, which he begged might be read.

Mr. NEWTON, Mr. AITKIN, and other delegates, contended for an adjournment till the following day. The last proposition, which had not been touched upon at all, they said was the most important of the three, and required to be fully discussed.

Mr. HARRY CHESTER (Chairman of the Council) suggested that they should go on some little time longer.

Mr. PRIDEAUX said, Mr. Ainsworth being present, he thought that gentleman ought to have given them some information on the subject of the Preston strike. He denied the inference of Mr. Hindley, that the question in dispute was between the masters of Preston and those of Blackburn.

Mr. WOOD (Stonemasons' Society) advocated courts of arbitration.

Mr. PETTITT appealed to the public to decide which party was in the right now that the whole of the working classes were in favour of the principle of arbitration.

The expediency of an adjournment was again discussed, and it was suggested that the Conference should be resumed on the following day, at some other place to be fixed upon.

Mr. HARRY CHESTER said no proceedings could be recognised by the society which did not take place in their own hall. The arrangements of the society precluded an adjournment of the discussion.

A further conversation was terminated by Mr. LLOYD JONES moving a vote of thanks to the Council of the Society of Arts for giving them the opportunity of discussing the questions in dispute between masters and men.

Mr. PARR seconded the motion, which was carried unanimously.

Mr. CHESTER returned thanks, and said the object of the council in calling that conference was, as had been stated by the noble chairmain, to exhibit neutral ground with a view of bringing this question to the test of reason.

Lord GODERICH then proposed a vote of thanks to Lord Robert Grosvenor, for his kindness in taking the chair, and the ability and impartiality with which he had conducted the proceedings. He need not say a word to induce a favourable reception of that motion. He thought the decision they had come to was the best. As the last of the three propositions appeared to be the most important, and, as there was not time to discuss it, rather than discuss it hastily it was better to leave it untouched.

The motion was seconded by Mr. Newton, and carried by acclamation.

The noble CHAIRMAN returned thanks for the manner in which he had been supported in the discharge of his duties on that occasion. The only regret that he felt was, that the council had not selected a chairman of greater popularity and standing than himself to preside over that conference. But the determination had been so manifest throughout, to invest the proceedings with the character of solemn and dispassionate discussion, that his task has been a very easy one. He trusted, although the opinons expressed had been various, that some steps had been taken, small though it might be, towards the settlement of this most grave and important question. It was the first time, he believed, that it had been discussed in this sort of way. It was an encouragement to proceed for the future; and if it should please God that good should arise from this conference, one of the most agreeable recollections of his life would be, that his name, however humble, had been connected with it.

The conference then terminated.

CORRESPONDENCE.

The SECRETARY has received the following communications from persons or Associations to whom invitations were sent to attend the proposed Conference:—

SIR,—I beg to acknowledge the receipt of your invitation to a conference on "Strikes and Lock-outs," to be held in the room of the Society of Arts, &c., on the 30th instant.

The propriety of this Association appointing a representative to attend the conference. was fully considered at a meeting held yesterday, and it was felt to be unadvisable that the Association should be so represented.

The Association deeply regrets the existence of the present disputes between the employer and the employed, and it has done, and will continue to do, everything in its power to prevent such disputes arising, and to adjust them. should they unfortunately arise, but it does not appear to this Association that the proposed conference will at all tend to the good results which are believed to be ardently desired by its promoters.

During the late disputes in the iron trades, a proposition was made to submit the differences to arbitration, and the good offices of Lord Cranworth were sought, but, his lordship in a letter to Lord Ashburton, pointed out in the clearest manner, that the matters in dispute were not matters to arbitrate upon, that the relations between employers and employed were of the simplest nature; that if the parties were left to themselves, differences would soon be adjusted, and that it was only the interference of other parties which complicated such differences or rendered difficult their adjustment.

The association, to use the words of Lord Cranworth, "fears from what has passed. that there is too much heat now to expect that any temperate advice will be attended to."

The letter I have alluded to contains so much that is pertinent to matters which it is proposed to discuss at the conference, that I beg to enclose you a copy of it,

I am, Sir,
Your obedient Servant,
OLDHAM WHITTAKER,
Chairman of the Local Association of Spinners and Manufacturers, Ashton.

Hurst, near Ashton-under-Lyne,
January 28th, 1854.

SIR,—I have received your letter, inviting the attendance of a representative of the Masters' Association of Hyde, at a conference of the general Associations of masters and operatives of Manchester and Preston, at the house of the Society for the encouragement of Arts, Manufactures, and Commerce, London, on the 30th instant, on the subject of "strikes and lock-outs."

Assured as every one must be, that this conference has been suggested by a benevolent desire to stay the disastrous continuance of the strike and lock-out at Preston, I beg on behalf of the masters of Hyde to offer to your society their thanks.

But I should be wanting in candour if I withheld the expres-

sion of my thorough conviction, that the proposed conference of master manufacturers and their work-people, by representatives from those associated bodies, could lead to no good result—that any such conference would be a scene of mutual complaint and reproach—would end in disappointment and irritation, and could do nothing towards removing existing difficulties, and that therefore no such conference ought to take place.

The recognition by the masters of the work-people as an associated body, or their meeting such body or their delegates in any conference, would, as it appears to me, be an invitation to aggression, and an encouragement to the invasion of the rights of property; and I therefore believe it to be the bounden duty of the masters to decline any such conference. It is with no feeling of disrespect towards the important and industrious body of operative factory people that I venture to maintain this opinion. It is from a sincere regard for their true interests and to save them from being led astray by false lights in the pursuit of a phantom bearing them to destruction, that I would advise the masters to take this course.

One important fact, as to which many persons (perhaps among them, the writer of the article accompanying your letter) are under a misapprehension, ought to be better known, and it is this:—that the masters are not in the habit of being in a state of combination; on the contrary, that they have a strong repugnance to that state. Ordinarily each of them superintends his own concern, rather in a spirit of rivalry and competition with his neighbours, than as their confidant or associate. Each makes such improvements in his machinery and other facilities as he may—each is shy of disclosing his methods to others, regulating his own mill as may best suit his means or his judgment, and paying such wages to his hands as are generally current in his immediate neighbourhood. In short every master pursues his own course independent of, and isolated from, the rest.

The masters *never* combine, either for the purpose of fixing wages, the hours of work, or for any other purpose except only that of self preservation, when the movements of the associated work-people tend to depriving them of the control of their own property. Were the masters inclined to combine, they would do so against the cotton merchants, the coal dealers, or the cloth or yarn buyers, in order to keep down the prices of the former, or to uphold the prices of the latter, rather than against their hands to regulate wages and work. They never combine for any of those purposes, because they are sufficiently well informed to know that the value of labour, like the value of commodities in general is governed by laws beyond the control of any combination of men. They know that wages can neither be kept down by them, nor raised by the workpeople, and cannot safely be tampered with, either by the legislature or any other body of men united with that intent.

The work-people, by means of their union, aim at *forcing* the masters to advance their wages, a project as futile as would be that of the masters going in a body to the Manchester Exchange and demanding an advance in price upon cloth and yarn.

The consequence of conceding this demand would be ruinous both to masters and workmen. The paid agitators would have achieved a victory which they would use as a foretaste of further conquests. The internal regulations of the mills, the imposing fines for spoilt work, the employment or dismissal of hands, the kind and quantity of goods to be made, and to whom to be sold, and other equally important matters would be dealt with by the union, until the only power left to the masters over their own affairs, would be the privilege of finding money for the buying of cotton and materials and paying of wages.

The end of all this would be the ruin of the weaker masters, and the withdrawal from business of the stronger; and it is their duty to themselves, to the country, and more especially to the deluded turn-outs, to resist, at whatever cost, this attempt, by means of a combination of workpeople to control and thereby endanger, and ultimately to destroy the greatest staple manufacture of our country.

The workpeoples' union embracing the whole of the cotton districts around Manchester, have for several months past been supporting the turn-outs at Preston, their design being, first to conquer the Preston masters, and then to attack those of the other towns and districts in detail. The masters seeing the danger which threatened the peace and prosperity of the manufacturing districts from this movement, reluctantly associated together to resist it, by directing their united powers to the support of the masters at Preston, so that none of them should be crushed by their hitherto unequal contest with the whole body of factory operatives; and I doubt not that eventually the work-people will, by the now united masters, be rescued from the pursuit of their disastrous schemes, which, if they could unhappily accomplish, would destroy a vast source of employment, and bring down misery and starvation upon thousands of their families.

I am, Sir,
Your very obedient Servant,
JOSEPH HIBBERT.
Secretary of the Master Manufacturers of Hyde District.
Hyde, January 28, 1854.

GENTLEMEN,—I thankfully acknowledge the receipt of your invitation to the conference, and have to regret my inability to accept of it, as I consider the occasion to be of the highest importance to the country at large.

If the following observations relative to the *Sunderland Shipwrights' Arbitration Court*, will in your opinion be of any use in your deliberations, they are at your service. This court has been in existence upwards of a year. Its constitution is simply as follows:—Nine masters and nine men, elected by their respective bodies, compose the court. There are three presidents, chosen by the court, gentlemen disconnected with the trade. Should a dispute arise between masters and men, or any important alteration in trade be deemed necessary, a court is called, and the matter discussed in a friendly and temperate manner. If the two parties argue themselves into an agreement, well and good; if not, then the dispute is settled by the decision of the presiding referee aforenamed.

If the decision is not satisfactory, the dissatisfied party can appeal to the other two referees, whose decision is final. The existence of this court is but brief, and it would be premature to presage of its future results; but this I am in justice bound to say, that so far as it *has* gone, it has worked admirably, and satisfactorily to all parties concerned.

As regards the second proposition in your programme, it is my firm opinion that the establishment of such a mode of settlement would in a large majority of cases, totally prevent 'partial strikes,' for which the expedient of 'lock-outs' presents a very poor and questionable remedy.

Third proposition. In some departments of our trade we have task work, similar to piece work. We have a certain quantity of work to perform in a day. Previous to the existence of this court, disputes of an angry nature in respect to this department were of frequent occurrence. Our arbitrators discussed the matter, drew up a regular graduated scale, mutually adopted it, and have proceeded harmoniously ever since.

Another case I might cite. At the commencement of this winter we brought before the court a uniform table of time, for work hours during the winter months. Hitherto, the regulation of this had been left to the "discretion" of the parties having the ringing of the bell. Great dissatisfaction was prevalent on this subject, and frequent disputes were occurring. But we agreed to a table, to be the standard throughout the whole district, and we have found it work excellently. I might here remark, that we have all our agreements printed on cards or otherwise, regularly signed, and distributed amongst both masters and workmen.

A few months ago, the men requested a shilling per day advance in their wages. The masters peremptorily refused, and gave notice to the men of their intention to *reduce* the wages *sixpence* per day. It was a dead lock, and it appeared to all that a strike was inevitable. A meeting was brought about between the whole body of the men and a deputation from the masters. The men, through their spokesman, enumerated their reasons for requesting an advance. The masters addressed the men on the prospects of trade, state of money market &c., showing their inability to concede to the men's request. The men from this interview, learnt facts of which they before were ignorant; the result was, the mutual withdrawal of the notices, the preservation of good feeling, and the resumption of work as usual.

If my individual testimony is of any worth, so far as my experience of this plan goes, it is my conviction that the principle is *applicable* to *all trades*. One grand feature it possesses, is the fact of bringing the parties together to discuss temperately, in the presence of a disinterested gentleman, their differences. Then mutual explanations are made, and probably both parties receive knowledge respecting the point at issue, of which before they were totally ignorant, and must have remained so, acting upon the old antagonistic principle of fighting their battles at the "long range distance," and by which means, the worst feelings were generated towards each other, and the breach rendered wider, until all were involved in one common ruin. Another good feature is, that it teaches all, that *mutual concessions are no concessions*, and that each may retire from the contest without compromise.

Well would it be for this country, if this system had general

adoption. The only elements requisite, are intelligence and temper; and I would fain hope that amongst our numerous working class in all trades, those ingredients are not wanting. Hoping your laudable endeavours will be crowned with success,

I remain yours, Gentlemen,
Most respectfully,
GEORGE GAMSBY.

Sunderland, January 29, 1854.
To the Council of the Society of Arts.

The SECRETARY has also received the following communications *since* the Conference:—

DEAR SIR,—On thinking over what passed at the conference, it came to mind that several of the workmen delegates had expressed a wish for a better understanding between the masters and men, as a means of preventing strikes, and to give other good results, and that this was hardly sufficiently responded to by the masters present. My brother and I have tried a great many experiments upon the work-people here, and the result has been the firmest conviction upon our minds, that the greater consideration that working boys, girls, and men are treated with, and the more their interests are studied, the more they study the interests of their employers; and, what is of greater value as a fact, the shareholders in our company, a large mixed body, some 600 in number, have cordially sanctioned the experiments, or rather the extending the scale of the experiments, and are perfectly satisfied with their results. Not feeling certain how far kindly feeling in the operatives would tell upon mere routine work, as in the cotton and other mills, we asked a man whose business it has been to closely study the working of a great many mills. He said the result would be the same in work however routine. Many manufacturers have tried all that we have, and some no doubt, are doing more; but manufacturers, as a class, dont talk much about their doings; it is only in a public company like ours, where every shareholder has a right and expects to know all that is done with his money, and talks about it with his friends, that everything gets published. Many improving manufacturers have compared notes with my brother and myself, and they all say as we do, that, in proportion as the operatives are treated with consideration and kindness, and are well looked after, so is the work done cheerfully, actively, cheaply, and well. I ought to have said—not written—this: however, the delegates were expected to speak, and the time was precious.—I am, dear Sir, yours truly,

GEO. F. WILSON.

Price's Patent Candle Company, Belmont,
Vauxhall, London, Jan. 31, 1854.

SIR,—The conference at the Society's rooms has been productive of good results. One was, the unanimous agreement of all parties in the desire for such an alteration of the law of partnership as might enable industrious and skilful men to obtain sleeping partners in capitalists with limited liability. This alone, ably argued by Mr. Slaney, was worth the exertions made. But there was much more. The political economy part of the question, the supply and demand which must inexorably determine the question of wages, was ably set forth by Mr. Fort and Professor Pryme, late of Cambridge, and also by one of the delegates. Mr. Hindley took the humane side of the question, contending that the working people should be treated like men, and not as a part of the machinery of a mill. Mr. Lloyd Jones, in an able speech, followed up this subject. Mr. William Newton was eloquent on the necessity of raising the condition of the workmen; insisting that, whatever might be the laws of political economy, it was not by such expounding that we could get rid of the discontent of underpaid and starving work men. Human nature would rebel. Robert Owen proclaimed his version of the laws of nature—that all masters were tyrants, and all workmen slaves, and then broke down, for the "sands of speech were run;" all speaking by a ten-minute glass. Mr. Henderson, of the firm of Fox and Henderson, insisted strongly on the desirability of good feeling between employer and employed, and acknowledged the possibility of joint-stock factories existing as well as joint-stock railways. Mr. Pare, while acknowledging the soundness of the political economy of Mr. Fort, insisted strongly that production was yet far from its maximum; that the wages fund which Mr. Fort treated as a fixed quantity, was, nevertheless, capable of expansion. Mr. Fort added, that this was a question of the future, not of the present. Mr. Pare went on to show that, were the workmen interested in profits, a factory would produce twenty to twenty-five per cent. more, by the individual energy of each put into mutual operation.

The clear-headed intelligence of all the workmen was remarkable; and we have reason to be proud of our people, even if wrong-headed on some points. The absence of the employers with whom they were at variance was to be regretted.

Upon the whole, the impression given was, that the greatest grievance, greater even than the low wages, was the charge of inhumanity, of coarse, contemptuous, unchristian spurning of men by masters; which, rightly or wrongly, was charged against them, not as a body, but as individuals. Kind and generous testimony of good masters and good workmen was given on both sides, showing clearly that the breach is not deep. Another fact, judging from the conversation amongst the workmen, came out; the employers most disliked, and most accused of harshness, are those who have risen from the condition of workmen.

If this be so, it is a subject for very grave consideration. What is the condition of education amongst the workmen, which promotes the growth of noxious qualities, to be exhibited when prosperity developes them. Money-making is clearly compatible with an inferior condition of citizenship. The strength of a community is to be found in its united friendship; and power, in the possession of mere selfishness, saps the roots of permanence.

In adverting to the political economy of the wages question, Mr. Lloyd Jones made a very pertinent observation. He insisted on the possibility of wages being unnaturally depressed by the competition of masters depreciating the value of goods by throwing too many into the market—forcing sales, in short—and thus establishing prices so low that good wages could not be afforded.

Now, it is well known to all shop-keepers beginning business that to offer any cheap goods is an infallible mode of attracting customers, but the after-process of raising the prices to a remunerating quantity, is a matter of considerable difficulty, and the consuming public has an advantage through competing manufacturers. But although this competing process gives two shirts to the public at the price of one, the general body of shirt-makers get the same amount of wages from the general fund. If one shirt were given instead of two the public would have less shirts, but the shirt-maker would have no more money; and if his time be only half occupied, and he be not remunerated, it makes little difference to him giving two shirts or one.

One of the speakers stated, as a great hardship, that a firm made £14,000 per annum profits, while all the working people were very much underpaid, and seemed to think that the division of it amongst the people would have been an advantage. What the numbers of the workers were was not stated. Supposing them 1,000 the profit would be at the rate of 18d. each per week, to go to the capital fund less maintenance of the employers—about 14 per cent. If it had been divided amongst the workmen there would have been no savings, and no trade can be carried on permanently without savings.

Let us begin at the beginning. The whole food, clothing, furniture, and dwellings of the community constitutes a given quantity, and they are divided unequally

amongst the different classes of the community. The distributors help themselves first to as much as they want, and the remainder goes amongst the various classes, the best to the most powerful, and so on, till lower down in the scale the quality and quantity lessens. If the total amount be not sufficient for all, the least powerful suffer, and in the extreme verge, the workhouse supplies those who do not actually starve. It is price that regulates the distribution; the rich are first served, and the poor last. What so just or easy as to divide equally all round? the poor will exclaim. But it is not so easy. The rich and well-to-do are really the most numerous and powerful, and the poor a minority. The well-to-do are workers, and will not consent to a condition of discomfort; and if the whole food of the idle rich were to be divided amongst the poor, the process would be akin to throwing the parson's dinner into the parish cauldron, scarce a flavour for each.

If the quantity could be increased to give all enough, or if the poor could all be shipped off, the condition of all would be that of comfort. To prevent poverty it is essential that there should be no inferior trades, and that there should be abundant work for all at high wages. High wages cannot exist with a surplus of workmen.

Let us imagine a condition of things in England in which all employers were prohibited from competition with each other, and all workmen, not being in surplus, were paid ample wages for fabricating cotton cloths to supply the rest of Europe, no one else understanding how to make them. This would be a workman's paradise, as long as it might last. But if the workmen increased in numbers, other things being the same, the wages of each would lessen. If in neighbouring countries working people existed who could make cotton cloth equally well, the general wages would have to be divided between them and the English workmen for the supply of the markets of Europe; and, in proportion as the workmen of other countries took up the same trade, the less must be the proportion of wages, unless the demand increases. If the English workmen, by their greater skill and the aid of machines, can do more work than the foreigner, with less labour, they may hold their own. But if the foreigner is contented with a lower rate of wages, the competition goes on again. If the foreigner gets the same machinery with cheaper labour, the race of competition must be to him, and the only remedy in such case would be to abandon the trade for some other, or to emigrate to a land like America or Australia, where workmen might be at a premium. It should be one of the duties of the boards of trade, which all seem to consider a desirable mode of settling disputes between employers and workmen, to determine the periods when trades can no longer be pursued to advantage, and to warn the workmen to seek other employments.

Mr. Fort was quite clear in stating that if any body of workmen could artificially succeed in naming the rate of wages, that some other workmen must suffer for it; he might have added, unless they could commence a new and more profitable business. Wages are raised in Australia by the profitable business of gold digging.

Mr. Lloyd Jones insisted on combinations amongst workmen having a tendency to raise the rate of wages, and quoted tables showing that the trades in union had the highest rates. But he did not show that this was a real rate; he did not state how much per cent. was paid to keep out competing workmen. If workmen were kept out by other means, as limiting the number of apprentices, then it was simply establishing a monopoly of work by arbitrary power, as objectionable as any other arbitrary power.

There is no doubt that certain classes of workmen might, under peculiar circumstances, keep their trades wholly to themselves, supplying limited markets, and shutting their eyes and ears to the murmurs of other workmen. But so long as the general body of workmen are in surplus there will be a tendency for national capital to decrease, to the certain misery of themselves as well as others. I do not mean to say that the surplus may not be converted into a deficiency by the discovery of new fields for labour, but that if the labourers come in advance of the labour—the mouths before the food—there will be trouble. The surplus can only be diminished by one of two processes—emigration, or the supply of work. Any arrangement that can facilitate the free transit of labour, taking it from overstocked employments and supplying it to the understocked, would be an advantage. Could the weavers of Preston have turned to digging coal or stone, or making shoes or ironwork, there would have been no need to strike. I believe that Birmingham is more free from strikes than other towns, and that the reason is, employments in the iron trades are analagous to each other, and there are large numbers of small masters who change from one class of work to another—from gun locks to door locks, and from gun barrels to gas tubes; from nails to screws, and from bolts to spikes. Everywhere we have complaints of the want of workmen and labourers, showing that the total numbers are not in excess; and if weavers can only get 14s. per week, it is high time that they should inquire by what process men in Birmingham can triple that amount. If English workmen were educated so that they could substitute the cheap enjoyments of the reading-room for the filthy ones of the public-house, they would rapidly rise into capitalists and shareholders; and they must live in hopes of their "good time coming."

W. BRIDGES ADAMS.

Jan. 30, 1854.

HANTS AND SOUTH WILTS LECTURERS' ASSOCIATION.

The object of this Association, it will be remembered, is to facilitate the establishment of institutions, the delivery of lectures, and the formation of classes. It is not proposed to interfere in any way with the institutions, or to dictate any conditions, but such as are necessary to the Association itself. Neither does it profess to send out or appoint any lecturer, or to prescribe any particular constitution for the Institutions. The first report states that—"Two ways of proceeding are recognised—the first suitable to village, or small town, or parochial institutions, namely, that of mutual assistance, by which all expenses incurred on account of lectures may be avoided. Each institution, by this plan, provides one lecturer, who, in succession, may deliver the same lecture, if he so please, in the other Institutions in the same circle. The second has reference more immediately, but not exclusively, to towns, and offers a list of gratuitous lectures to the choice of such places in Union as are desirous of availing themselves of them. The distinction between the two will be evident. By the first all expense is avoided. Each lecturer bears his own expenses, giving his own lecture, and receiving those of the other lecturers in the same circle in regular succession, thus supplying, as the circle may be arranged, one or two lectures a month. By the second, the only expense to the Town Institution will be the personal expenses of the Lecturer. In some cases it may be convenient for the Town Institutions to join the mutual assistance plan for one or two lectures a month, as the case may be, or for one monthly lecture on this plan, and draw from the list for another. To all, as they by degrees accumulate, the diagrams will offer a means of avoiding expense, and while they suggest subjects, remove difficulties which have been hitherto experienced in procuring illustrations. In reporting progress, fifteen sets of diagrams have been purchased, as also a phantasmagoria lantern and four different sets of sliders." The diagrams have been in great request. Thirty institutions have placed themselves in union; and Reading-rooms have been established in a considerable number of towns and parishes.

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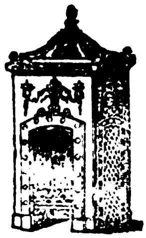

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Journal of the Society of Arts.

FRIDAY, FEBRUARY 10, 1854.

TENTH ORDINARY MEETING.

WEDNESDAY, FEBRUARY 8, 1854.

The Tenth Ordinary Meeting of the One Hundredth Session was held on Wednesday, the 8th instant, HARRY CHESTER, Esq., in the Chair.

The following candidates were balloted for and duly elected:—

Chambers, William, jun.	Levi, Leone, F.S.S.
Mackenzie, Rev. Charles, M.A.	Robartes, Thomas James Agar, M.P.

The following Institutions have been taken into Union since the last announcement:—

336. Bristol, Early Closing Association (Education Department).
337. London, St. John's Wood, Literary and Scientific Society.
338. Middlesbro', Mechanics' Institute.
339. Newcastle-on-Tyne, Northern Union of Literary and Mechanics' Institutes.

The SECRETARY called attention to some plates made at Halla, a large town about 30 miles to the N. W. of Hydrabad, in Sind, and which had been sent to the Society by Mr. Finnimore, of the Bombay Artillery. They were made from a pattern furnished by that gentleman, from sand or clay procured from the bank of the river Indus. When made they were placed in the sun to dry, and afterwards the different devices were painted with a brush and the glazing mixture laid on. The plates were then put into a kiln and baked. From the same sand large quantities of bricks and tiles, both glazed and plain, of a superior quality, are made, and also pans, &c., for domestic purposes. The workman sits on the ground with his legs stretched out on each side of the potter's wheel, to which he gives a rapid circular motion. Large numbers of both men and women are employed in the manufacture, on small wages.

DISCUSSION ON THE DEFECTS IN THE ADMINISTRATION OF THE PRESENT PATENT LAW.

The CHAIRMAN said, that at the two last meetings the question had been discussed as to the expediency or inexpediency of having patent laws. The opinion being generally expressed in favour of some law of patents, the object now was to endeavour to see what improvement could be made in that law, and also in its administration. In order to render the discussion practical, it had been proposed that the subject should be arranged under four heads, namely:—first, Cost; secondly, the question of Preliminary Examination; thirdly, the Nature of the Tribunal; and fourthly, Length of Term and Renewal. He would now suggest that they should proceed to discuss the question, and would call upon Mr. Webster to open the debate.

Mr. DENISON said—By the notice which had been issued to the members he presumed the subject for the evening's discussion was "The Defects in the Existing Law of Patents." He had come prepared to discuss that question, and he had a long list of what he considered defects in the present system; but he now found a notice of a different kind placed upon the board, which he was not then prepared to go into. First, as to Cost—that was considered by some persons a merit; then, as to Preliminary Examination—amongst some patent witnesses that was considered a defect, by others not so; the Nature of the Tribunal—what had that to do with defects? If it was intended to discuss that, he would prepare himself for it; but he submitted they had no right to say it was a defect: and then, as to the Length of Term and Renewal—was that any defect? He protested against this mode of dealing with the subject.

Mr. WEBSTER remarked that any one possessing a knowledge of the subject, could not, in his opinion, have a more convenient mode of dealing with it than the one proposed by the Council.

Mr. COLE said it appeared to him that under the head of cost, for instance, they might discuss a defect. The present law might say, "you have no right to a patent unless you comply with a certain process, involving cost," which some persons might regard as a defect.

Mr. DENISON said if the subject were so treated, he had no objection to offer. He was prepared to tell the meeting what he considered the defects in the present law of patents, but he should object to being stopped on the ground that what he might advance was not included in the four heads suggested by the Council.

Mr. WEBSTER would wish, in the first place, to correct a statement he had made in his paper, to the effect that the Carpet Printing Machine at Crag Works, near Macclesfield, was the joint production of Mr. Burch and Mr. Fothergill. From a communication he had received from Mr. Burch, it appeared that the entire invention, design, and construction of the machine in question (unaided by any excepting the necessary workmen) were due to that gentleman, and that Mr. Fothergill, had he had an opportunity of doing so, would have disavowed all participation therein. With regard to the first question, that of Cost, he had very little to say. No doubt under the old system it was looked upon as one of the greatest abuses. He believed the feeling generally was, that the present cost was unobjectionable; for instance, for 5*l*. an invention was protected for six months; at the end of that period a patent could be obtained for 20*l*. more, for three years; it could be further secured for fourteen years by the payment of 50*l*. at the end of the third year, and 100*l*. at the end of seven years,—the result being the securing a patent for the whole of the United Kingdom for fourteen years, upon payment of a total sum of 175*l*. That, he thought, left very little to be desired; for if an invention did not answer, it left other ingenious people a clear stage for improvement upon it without the risk of infringement.

The CHAIRMAN—Then you think a further reduction of the cost is not necessary?

Mr. WEBSTER thought not. It was small compared with the cost of registration, which was 10*l*., whereas they got an equivalent to a patent for six months for 5*l*. He thought it was not desirable to have such things too cheap; some might think a man entitled to his patent at the lowest possible rate; all he (Mr. Webster) could say upon that was, it would be a very good thing for the lawyers.

Mr. COLE differed from Mr. Webster as to the present amount of the cost of patents being a settled question. In olden times people thought 100*l*. was the right amount, which was afterwards increased to 300*l*. Now, they had come down to 25*l*. for three years for the whole country. If inventions were good things, was it right for the State to tax them? It seemed like taxing knowledge. Why should the registration of a claim for a patent cost the inventor 25*l*. How was the money spent? He was told that the Attorney-General had more than the salary of a Prime Minister for examining patents, and the Solicitor-

General about the same. Why were persons to pay 7000*l.* or 8000*l.* a-year to those functionaries for this examination of patents? If it was a real thing, let the public pay as they did; but was it a real thing? In his opinion it was not a question of cost at all; it ought only to be the bare fees for registration. He thought registration ought not to be crippled. What he would say was, have it as cheap as it can be, and let inventors pay for the services performed by the State, and no more; all beyond that was indefensible in principle.

Mr. STANSBURY said, it seemed to him that Mr. Cole had struck upon the right principle in this question, which was, that people ought not to pay more for Government than what it fairly cost; and as to a patent costing 25*l.* for registration, it was quite out of the question. He would illustrate the matter by reference to the American law of patents. The fee for a patent in that country was only 6*l.* The office of the Commissioners of Patents was a large building, where models were displayed. Examination was there a real thing, and a large corps of officers was supported. Scientific men were employed to make the examinations, and they did the work. Three-fourths of the applications were rejected, on the ground of the want of novelty; and the 6*l.* fee not only paid all the expenses of a large establishment, but a fund of 200,000 dollars had been accumulated; and if that were the case in America, he saw no reason why a patent in England should cost 175*l.* for the same period of years. It seemed, therefore, to him, that the present law was open to objection on the score of cost.

The CHAIRMAN—You mean that it ought to be reduced to the lowest point consistent with the payment of expenses?

Mr. CORNELIUS VARLEY contended that the expense was a great obstruction to inventions; and that the fees ought to be confined to the cost.

Mr. ALEXANDER CAMPBELL said, for many years he had had experience with working men, who had endeavoured to bring forward important improvements; and who, by small contributions amongst themselves, raised some hundreds of pounds, both under the old law and the new one, to bring out new improvements. Some of the best productions had emanated from working men, but, from their pecuniary position, they could not bring their improvements properly before the public, and the public to a great extent had lost the advantages of those inventions. The present law must be considered an improvement upon the old one, but still he thought there was a large margin open for further improvement. As had been very properly remarked, why could not they in this country give the same facilities for bringing out tangible inventions as were afforded by their transatlantic brethren. It was true that a 5*l.* stamp would secure an invention for six months, and 25*l.* for three years; but he appealed to the experience of many present whether it was not within their knowledge that some of the greatest improvements of the age took years even before the public could be convinced of the propriety of adopting them in practice. He knew instances in which thousands of pounds had been expended in bringing out inventions, though these inventions had received the approbation of the most experienced scientific men; but the public had to be convinced, and public opinion raised in favour of the invention; and as capitalists were cautious and chary in the application of their money, the requisite funds for bringing out the invention might not be obtained in the first, second, or even the seventh year. Supposing an invention were patented for three years, a working man would make it known as far as his means permitted, but at the end of the three years he might be unsuccessful in bringing it before the public; and yet, without having derived a shilling from the invention, he was called upon to pay 50*l.* more; whereas if genius were encouraged instead of taxed, the advantage would not only be to the parties most immediately interested, but also to the public at large. He had no hesitation in saying that th cost of patents ought to be reduced to the smallest min mum for which it could be effected, and all encourageme should be afforded to inventors to secure the inventio and thereby obtain the greatest advantages for t community at large.

Mr. DENISON said there were other matters of cost be mentioned. If, as was assumed, patents were to exi and all possible encouragement be given to invention and a right of property in those inventions, he could n conceive why there should be more than the bare fees f registration. If not, then they should adopt a large t for the discouragement of inventions, as some of t patent witnesses had said there was an advantage in th course. There was another matter of cost. The 175 mentioned was not the real cost of a successful paten Mr. Prosser had said that every successful patent unde went a lawsuit, and was not worth anything until it ha In a patent possession was not nine points of the la until the patent was proved, it was worth nothing; a could they do that for 50*l.*, 100*l.*, or sometimes ev 1000*l.* What did this cheapening come to? Patents no value would be cheap, but for a substantial pate they had no certainty that the cost would not be 1000 Sir David Brewster's remedy for that was certainly ve conclusive, if it had no other merit. He said he woul have no litigation whatever—that there should be a pr liminary board, and as soon as a patent was grante that ought to be conclusive against all the world. Th was strong, but simple. But how was the law to be p in force? It would be merely the substitution of a crim nal for a civil proceeding, and instead of going into th Court of Chancery to restrain piracy, they would go the Old Bailey. Mr. Prosser had said he would take the to the County Court. That sounded well, and sounde cheap; but he (Mr. Prosser) was asked what was th cause of the expense of the patent lawsuits? He replie "witnesses and lawyers." How did witnesses come to so much expense? Scientific people required to be pa highly; and it was not probable that they would char less for their attendance at the County Court than Guildhall. Another case was, that sometimes they cou not get scientific men, and therefore they obtained cheaper class of witnesses, who had to be dressed up to lo respectable. That was practically Mr. Prosser's vie But, again, the lawyers were expensive. Why? Becau a patent often involved a large sum of money; and su a person as he (Mr. Denison) would not be called in; b the Attorney-General was retained, who would not s out of his chambers for less than 300 guineas. But w that all? It was a saying, that the rich man had th advantage of the poor man. A rich man might spe 2,000*l.* or 3,000*l.* in buying up patents; but if a poor m held a patent, and was threatened with a lawsuit, would sacrifice everything, sooner than risk that whi might ruin him. But there was another thing mention by Mr. Prosser—a witness in favour of patents—that, i asmuch as lawsuits were so important to the solidity of patent, those lawsuits were made collusive. Suppos he (Mr. Denison) were to bring an action against M Cole for piracy, they conferred, and instead of putti their heads together, they put their pockets together, a determined, instead of a bonâ fide action, to go on quiet until he (Mr. Denison) obtained the verdict. Then would go forth to the world as a patent established aft fierce litigation, and as a good patent all over the kin dom. There was another observation to be made up this:—There was a class of people who made money going round to persons having small things, not wor bringing forward. The party would say, "this is patente but, instead of going to law, compromise the thing giving me 5*l.*" He (Mr. Denison) was sure he would fo feit the 5*l.* rather than go to law. That was the con quence of the cost of lawsuits, which were an inevitab adjunct to patents, and which had nothing whatever do with the preliminary costs. He (Mr. Denison) was

opinion with Mr. Cole, that the cost ought to be reduced to the lowest possible point.

Mr. CAMPIN wished to state in reference to the observations of Mr. Stansbury, as to the working of the patent law in America, that the large surplus fund of the establishment did not arise merely out of the fees of 6*l.*, but out of the 500 dollars which was the cost of a patent to a British subject, and the 200 dollars to foreigners of other nations.

Mr. STANSBURY would state that the number of patents granted to foreigners in America from 1790 to the present time, did not amount to 200, and therefore that source of revenue was not very important. Since he had been in England he had communicated with the commissioners of patents in America, urging a uniformity in the cost. The system in America was to charge a foreigner the same as the foreigner charged the American. The 500 dollars in America was less than was charged in England. He however thought foreigners ought to be put upon the same footing with the citizens.

Mr. CURTIS said his experience in this matter was chiefly with regard to our colonies. The greatest defects existed in the patent laws in reference to the colonies. He was a forest owner in the West Indies, and when timber was cut, the great difficulty was to remove it from the forest. In the dry season that was readily effected by dragging it away by oxen along the hard ground, but with such rains as occurred in tropical climates the ground becomes so soft that such means were not available, as the oxen would sink up to the girths. Under these circumstances he set about constructing a sort of primitive railway with rough timber, over which the trees were conveyed. This was found to answer the purpose admirably. He thought such a railway would be good for Australia and he had come over to this country respecting it; but in the present state of the law it was difficult to know how to proceed as to patents for the colonies. The colony for which the patent is applied for, must be specified; and as he wished to apply his invention to all the colonies, he put down the whole 50 colonies of England; consequently he got no colonial patent at all, but merely one for the United Kingdom, including the Channel Islands. That he received under protest, because he wanted it principally for the colonies. He inquired the system which was adopted with reference to the colonies, but could get no information: he therefore took his own course. He knew that if he sent a letter to the authorities it would have been pitched into the fire and nothing more heard of it. He applied at the Colonial-office and pointed out the hardship of the case, and they consented to send 50 letters to the 50 colonies in the government mail bags; and although all the letters to the governors and councils were alike, all the answers to the same application were different—except where they gave no answer at all. Amongst others he had sent an application to Australia, accompanied with a copy of the preliminary specification, which so struck the Governor, that he sent orders to the Board of Roads to suspend the outlay for metalling the common roads in order to carry out this plan. When the cheapness and facility with which this system could be carried out were considered, it was surprising that the system had not been adopted in all the colonies. He was told that he must apply to the colonial legislatures for a private bill; the Governor of Trinidad promised the thing should be done: a petition was sent, and there it stopped; and he very much doubted whether it had not cost him more money and trouble for a colony with 6,000 inhabitants than would have been required for all England. He then read the following

Abstract from Official Replies to Applications made by Mr. J. Curtis, to the Colonial and Indian Legislatures, for Letters Patent for Improvements in Rail and Tram ways, and for an Apparatus for Excavating and Delivering earth.

1. Canada . .	Letters patent for inventions, granted only to subjects resident in the province.
2. Nova Scotia .	Persons that have resided one year within the B.N.A. provinces, and who deposit a model of their invention at the secretary's office, can obtain a patent; no other.
3. New Brunswick	Application cannot be granted, because it does not comply with the requirements of the local laws relating to patents.
4. Prince Edward's Island	The patent will be granted by the colonial legislature without charge.
5. Newfoundland	An oath or affirmation must be made before a judge of the supreme court in writing, that he (the petitioner) is the inventor or discoverer of the improvement.
6. Bermuda . .	Nil.
7. Vancouver's Island . .	Nil.
WEST INDIAN POSSESSIONS.	
8. Jamaica . .	An agent should be appointed to introduce the bill into the legislature.
9. Turks and Caicos Island	Nil.
10. Honduras . .	Will receive patent. To forward precedents.
11. Bahamas . .	No law in this colony granting the issue of patents.
12. Barbadoes . .	An agent should be appointed to introduce the bill into the legislature.
13. St. Vincent .	The Lieutenant-Governor cannot interfere in such a matter, nor can the Council entertain such a question.
14. Grenada . .	There is no general law in force in the island relating to patents, &c.
15. Tobago . .	Nil.
16. St. Lucia . .	There is no law in force in this colony to authorise the granting of patents.
17. Antigua . .	A private agent should be employed for the furtherance of such views.
18. Montserrat .	Nil.
19. St. Christopher	The legislature are prepared to meet your wishes, which will involve the by-no-means trifling expense of a private bill.
20. Nevis . . .	This legislature has no power to grant patents.
21. Virgin Islands	Nil.
22. Dominica .	Nil.
23. British Guiana	Nil.
24. Trinidad . .	The Attorney-General will prepare and introduce, at as early a period as possible, an ordinance for the purpose of meeting your wishes.
MEDITERRANEAN AND AFRICAN POSSESSIONS.	
25. Gibraltar . .	Nil.
26. Malta . . .	Nil.
27. Ionian Islands	These islands, forming an independent state, under the protection, but not a colonial possession of, Great Britain, the forms are inapplicable.
28. Cape of Good Hope .	A patent must be obtained in England, and then extended to this colony, either by Imperial sanction or by authority of local ordinance.
29. Natal . . .	The Council are of opinion that you are not entitled to a patent for your supposed invention.
30. St. Helena .	Nil.
31. Sierra Leone .	Nil.
32. Gold Coast .	Nil.

33. Gambia . .	The Governor will give his support at the next meeting of the Council.
EASTERN POSSESSIONS, &c.	
34. New South Wales	Deposit of £20 required to be made with the colonial treasurers, and petition then made to the Governor in Council, specifying the particulars of the invention fully.
35. Van Diemen's Land .	No law in the colony.
36. South Australia	Nil.
37. Victoria . .	There is no power to grant patents for inventions.
38. Western Australia	Nil.
39. New Zealand	Papers referred to Attorney-General; to make affidavits to assembly.
40. Auckland Islands.	Nil.
41. Mauritius. .	Willing to grant the patent in accordance with the colonial law.
42. Ceylon . .	The act recently passed does not authorise application for letters patent for the colonies, to be made to each colony respectively.
43. Hong Kong .	Not aware of any authority in the colony to grant a patent, which security must arise from the English acts.
44. Labuan . .	To communicate with Downing-street, in order that the Governor may be instructed. Length of island, 7 miles; breadth, 3 miles.
45. Falkland Islands . .	Nil.
46. Heligoland .	Your invention is utterly inapplicable, as the island does not exceed one-third of a mile.
47. Madras . . .	Referring to the Court of Directors of the East India Company.
48. Bombay . .	Referring to the Secretary at the India-house.
49. Bengal . . .	It is not in the power of the Government of India to accord any special protection to your invention.
50. India-house .	The general subject of granting patent-rights will, at an early period, come under the consideration of Parliament.

Mr. WEBSTER said, that the subject introduced by Mr. Curtis was a most important one, and the colonial question was one of the difficulties they had to contend with in their endeavours to improve the patent laws. Canada had a patent law of its own. In consequence of the difficulty of dealing with the colonies, the Government thought they would give no patents for the colonies at all for the present. His friend, Mr. Denison, had mixed up with the cost of the patent the cost of litigation in sustaining a patent. He believed the cost of 25*l.* would not be found more than was necessary, and he thought three years was a sufficient period for the patent to run, as there were very few successful inventions that would not be taken up by some capitalist in that time.

The CHAIRMAN said—the meeting would now proceed to discuss the second head, viz:—Preliminary Examination.

Mr. STANSBURY remarked that on the question of the expediency of preliminary examination he had no doubt—the only question was, as to what would be a practical system. The difficulties were altogether practical; and he would again refer to the American law, though he was not satisfied that the system adopted in that country was altogether correct. When he first became connected with the American Patent Office there were two scientific examiners, and the office was then six months behind its work. He remained some five years in the office, and when he left, though the number of examiners had been increased to six, they were just as much behind their work as when there were only two. The American law presented to the examiners two questions—first, the utility, and, secondly, the novelty of the invention. The question of utility was so loose a one that, practically, it had to be abandoned; the principle seemed to be that unless an invention was absolutely noxious it was useful: but the question of novelty was one of difficulty and breadth, which ought to be thoroughly investigated. The difficulty was that there should be some limit to the question of novelty as to the time, the country, and as to the office itself; or the rule must be adopted of granting patents unless some previous patent had been granted. But the American law did not put either of those limits upon the examiners. It was requisite for a patent that the invention should be new to the whole world—that the applicant should be the first person in the world who had invented it. In order to carry out that system one examiner would be wanted for each class of inventions; but it seemed that the multitude of examiners in the patent office of America, instead of facilitating the business only served to retard it. Yet with all those defects the system operated tolerably well, for the granting of a patent was a guarantee to the public that there was something new in it. In 1852, somewhere about 1000 patents were granted out of 4000 applications; and of the 1000 which were granted, it might be assumed perhaps that one in four was really useful. He would say a word as to the disadvantages of the American system,—first, the great delay of time and expense of the system; for as it was necessary to have men of the first class they must be paid high salaries. The commissioners of patents in America received a salary of 600*l.* a year; that might appear small, but in America money was worth more than in this country. There was also another difficulty, examiners being scientific men, there was a pride of learning, which was enlisted against the patentee, because, if the examiner failed to find out a similar invention, the patent was granted; but if he found out a similar one—no matter in what country or at what time, he could reject the patent upon that discovery—hence the pride of learning was enlisted on the side of rejections. They sometimes also took a pride in making out a good rejection. This tended to bring the system of examinations into disrepute, because practical men might think the objections frivolous and childish, and beyond that, the system was open to corruption, because where men had such vast power in their hands as the granting or rejecting a patent they were exposed to improper influences, or at least to the imputation of improper influences, which might be brought to bear by parties concerned in matters involving very large interests.

COUNT DE FONTAINE-MOREAU was opposed to preliminary examinations, because, notwithstanding the most anxious deliberations had taken place on the subject in France and Belgium, it had always been considered that they would be attended with insuperable objections.

Mr. COLE said, that, in his opinion, the example set by France and Belgium, as to preliminary examinations, was a good one. He thought that any individual could always do his own work better than any Government could do it for him; and he should be sorry that any scientific gentleman should have to pass a preliminary opinion upon questions of patents. Purely philosophical men were sometimes possessed by strange hallucinations. The meeting would recollect that when the building for the Great Exhibition was under discussion, an eminent authority (Professor Airy) proved to demonstration (on paper) that it must inevitably be blown down like a pack of cards; and yet they all knew that it had stood firmly. He should be sorry to see a system of compulsory examination. The inventors might have a choice of the right of examination; they might be content to take that peril upon themselves. It would be very well that they should ask for opinions and advice. He thought a great step had been taken by the publicity

that was given to specifications, for every man now might become his own preliminary examiner.

Mr. Campin said, it was in course of preparation to publish class lists of all inventions, from which an inventor might gather whether there was anything of the character of his invention already before the public. To carry it beyond the question of novelty, he thought, was an attempt to do too much. The best judges of utility were the public.

Mr. Webster thought there was some misapprehension as to what was meant by preliminary examination. With respect to America, he felt they had attempted a great deal too much. As to precluding a man from a patent, he agreed that it was impolitic to allow him to run his head into the fire; but there was another view of the case,—they heard a great deal about the misery which people brought upon themselves in fancying they had done a good thing; it was the duty of the state to give them some warning which they could not have from private sources. There were people who spent their time and money in the wildest hallucinations, the majority of whom might be checked at an early stage, if they had the judgment of some person in whom they had confidence. To that extent he thought preliminary examination might be useful, and that they were called upon to do it. He believed not more than one-fourth of the applications were granted in America. What, then, became of the other three-fourths? Some were, perhaps, cases of hardship. It showed that three out of every four had been prevented from following an invention either old or useless, and who, through having been checked in their progress, had given it up altogether. It also showed that there were evils attendant upon every patent system, and if patents were granted indiscriminately, those evils would be aggravated. He was sure that no person of experience would advocate the views of Sir David Brewster, that a preliminary examination should be considered conclusive in this matter. They ought not to preclude any one, but they should warn persons against following inventions which could be of no use. He felt, as he had already said, that America had attempted too much, but there was a difference between the system in America and that proposed by Sir David Brewster, which would adjudicate first. He believed, without any compulsion, but merely attending to suggestions in the first instance, many would not proceed beyond the first 5*l.*

Mr. Prosser, as a patentee, considered there was no greater reason for inquiring into the novelty or utility of an invention than of a book. A man who wrote a book at once obtained copyright for it, and he (Mr. Prosser) could not see why a man who made a specification of an invention should be required to go through an ordeal from which the author of a book was wholly exempt. The examination in all times and countries with respect to novelty in inventions, had failed. Galileo was examined as to his discovery. It could not be said that his examiners were ignorant men. No; they were seven cardinals, with red hats and red stockings, yet he could not convince them that the world moved. What did they do with him?—they put him into the Inquisition. There was very little difference in the subsequent treatment of inventors and discoverers. A man of noble means once applied at the gate of a convent for a little bread and water for a boy then eight years old—that was Columbus. Again, the Edinburgh people wanted a supply of water for their city, and scientific men were employed in the matter—and if he had contempt for one animal more than another, after a sailor in top boots—it was for your thorough going scientific. They never did any good beyond astronomy and the allied sciences—they never did any good for the steam engine. As he had said, the Edinburgh people wanted water, and Mr. Maclaurin, a great mathematician, and two other scientific men, were employed about it, but they could not agree upon the requisite bore of the pipes through which the water was to be led to the city: they differed as much as 1 to 9. They then sent for a man who was not a scientific, and he told them the size which would give them the water. James Watt was told by Smeaton, one of the greatest men of his age, not to pursue that phantom of his. He said: "You may improve the steam engine; but when you have done all, my opinion is, that the steam-engine may be made to work a pump and raise water, to turn a wheel and give an equable motion." Now if Smeaton had been an examiner, what would have become of Watt's patent. If they had his friend Mr. Denison for an examiner upon clocking, no doubt he would make a very good one, and although he had put him (Mr. Prosser) in the County Court, he had no doubt he would become a patentee himself one day. As a patentee, he (Mr. Prosser) objected to preliminary examination, because it implied that the person examining was the cleverer fellow of the two; whereas it was always otherwise. When installed as an examiner, a man was very scientific, very anxious, and very uneasy; but as he sat in his chair of Utrecht velvet, furnished at the expense of the country, with a salary corresponding with the chair, he got dozy—and your scientific being, put into an office where there was nothing to do, but much to think of, became a lump of adipose matter, only fit to be sent to the tallow-chandler's to be rendered down. He agreed that there should be a preliminary examination, but that every man should be his own examiner. He held in his hand 9½d. worth of specifications. He had been a patent reformer for twenty-five years, but he never thought it would come to that. If a man thought he had made an invention, he would very soon be able to get every specification on the subject, and read them for himself. England was the only country where the specifications were published. Much had been said about America. What did they publish? He would give any man 1,000*l.* for the Comissioners' Report for 1853; and 500*l.* if he got it in June, 1854. It would be out about 1855. Then, as to the remarks of the examiners, it was not an uncommon thing for inventors to wait nine months before they knew whether they had got a patent or not. In England they paid the money, and got it at once; and if there was any infringement of that patent, it was settled by law: it could not be done by conclaves of persons, because where there was no law, there could be no justice.

Mr. Curtis remarked that if an improvement for a railway was introduced it was submitted to the engineer, who almost invariably condemned it; if he approved the thing, he became responsible for its success, and that was the reason he threw cold water upon it; whilst if it succeeded, he created a rival, and was perhaps pushed out of his place. As regarded the necessity for preliminary examination, it might be desirable to see what had been done. He had made nearly fifty inventions, yet he had never taken the trouble to make an examination. With regard to the American system of not patenting a thing which had ever been done before, he thought that by such a system there would be scarcely any patents at all.

Mr. Denison agreed with most of the speakers in condemning preliminary examination for the different reasons stated, but he wished the meeting to remember the fact, that there were a number of defects in patents for which preliminary examinations could afford no remedy. He hoped it would be understood that they had not discussed the defects of the patent laws generally, and he felt assured that preliminary examinations would be no cure for the vast number of defects into which at that late hour it would be impossible to enter. As to a modified preliminary examination—to give information rather than create an obstruction, so long as the state levied a tax upon patentees, there might be something in it; but, as he thought, they ought to be allowed to have the patents for nothing, the state could not furnish information more than in matters of law. What were patent agents for, if not for the purpose of giving information? The indexes of the specifications were more copious and better arranged than they used to be, and would facilitate this object.

Mr. WINKWORTH said—with reference to the next subject—the nature of the tribunal—if there was to be no examination there would be no tribunal required.

Mr. COLE explained that a tribunal would be required, after the patent was granted, for determining cases of infringement.

Mr. WEBSTER said that involved the litigation of patents. He did not know that he should advocate a trial by jury, but competent persons might give their assistance, in the same manner as the Masters of the Trinity House, aided the judges in the Admiralty Courts.

Mr. PROSSER would ask any gentleman whether he ever met with a person who, when his patent was refused, was satisfied.

Mr. STANSBURY said that the American law allowed any person, whose patent was rejected, a power of appeal to the judge of the Court of Columbia; and if the rejection was confirmed, which was generally the case, two-thirds of the preliminary fee was returned, so that it cost the unsuccessful party only about ten dollars, irrespective of the cost of appeal.

Mr. WINKWORTH said that it was obvious, from the discussion of that evening, that whether we referred to the cost, the question of previous examination, the tribunals of reference, the greater or less duration of patents, or the 101 other objections to, and difficulties arising out of, the amended law of patents, which his friend Mr. Denison was prepared, if time had permitted, to lay before the Society, that it was a grievous infliction on those who sought the description of security it was intended to confer. Under these circumstances he would submit to the friends of patent right, whether it would not be judicious to petition the legislature to suspend the operation of the law as it now stood, until they could agree upon a measure that would provide for all the contingencies and anomalies of suggestive or creative talent.

Mr. COLE must protest emphatically against Mr. Winkworth's summing up. He believed there could not be a difference of opinion as to the present system being an improvement upon the old one, and that it was a remarkable one, still he thought it was capable of great improvement. He was grateful for what had been done up this time. He thought the publication of the specifications and indexes, matured by Mr. Bennet Woodcroft, reflected the highest honour upon that gentleman and upon the Government. Instead of getting rid of it, he would say that matters were at present *en couleur de rose*. There was a difference amongst some as to the principle, but he was sure Mr. Denison gave the preference to the present over the former system, and he might think we were on the high road towards a better state of things. He should be sorry that i should go forth that we thought the present system so intolerable that we would throw it on one side altogether.

The CHAIRMAN then said, the hour having arrived for the termination of the discussion, and his friends on each side of him having summed up—although perhaps not in accordance with the opinions of all present—the meeting would be spared a summing up from him. He thought the discussion had been entertaining, and in some parts not without its use. He regretted that it was not possible to discuss more fully the numerous defects in the existing law of patents; but it seemed incident to the subject, that it was found impossible, during three evenings, to exhaust it. With respect to the objection taken by his friend Mr. Denison as to the form of the discussion, he (the Chairman) could only say it had been introduced by the Council merely with the object of obtaining the views of the largest number.

The Secretary announced that, on Wednesday evening next, the 15th inst., Mr. W. C. Aitken would read a paper on "Ancient and Modern Metal Working and Ornamentation; with some allusion to the newly-discovered art of Nature Printing."

GALLERY OF INVENTORS.

A commencement has been made in forming this collection, and a list is appended of those portraits (oil paintings and engravings) which have already been got together. The intention and object of the collection have so recently been given at length, in the letter received from H.R.H. Prince Albert, printed in No. 58 of the Journal, that it is unnecessary to repeat them here, except that Members and others disposed to take an interest in, and assist in its formation, should bear in mind that it is proposed to include in it—not merely "inventors" in a restricted sense of that term—but discoverers in science, whose inventions and discoveries have had an important and beneficial effect in improving the condition of the people generally.

It should be borne in mind that it is contemplated to have a catalogue, containing short biographical sketches.

Members, and others, who can aid in procuring the loan or gift of portraits for this purpose, or can point out sources from which they may be obtained—and any information relative to biographical notices, are requested to communicate with the Secretary.

It is intended, from time to time, to publish the names of the additions made to the collection.

The following is the list referred to above:—

Sir Richard Arkwright.
Friar Bacon.
Robert Barker.
John Baskerville.
Dr. George Birkbeck.
Dr. Joseph Black.
Matthew Boulton.
James Brindley.
Dr. Edmund Cartwright.
W. Caxton.
Nicholas D. Dechémant.
Dr. Thomas Clark.
Sir Francis Crane.
Samuel Crompton.
John Theop. Desaguliers.
Earl Dundonald.
Henry Greathead.
Rev. John Harmar.
John Harrison.
Rowland Hill.
Nicholas Hilliard.
John Kay.
Justus Liebig.
John Mercer.
Geo. Fred. Muntz, M.P.
Sir Hugh Myddelton, Bart.
Thomas Paine.
— Papin.
Count Rumford.
Prince Rupert.
John Smeaton.
Earl Stanhope.
George Stephenson.
James Watt.
Abraham Wivell.
Marquis of Worcester.

LEGAL POSITION OF INSTITUTES.

A meeting took place at the Society's rooms on Monday last, the 6th instant, the Right Honourable Henry Tufnell in the chair, and attended by T. E. Headlam, Esq., M.P., Q.C., Dr. Michel, M.P., Mr. Bird, Mr. Cole, C.B., Mr. W. G. Lumley, Mr. Chester, Mr. Macdonald, and Captain Eardley Wilmot, R.A., when it was determined that steps should be at once taken for placing the legal position of Literary, Scientific, and Mechanics' Institutes in a more satisfactory condition, particularly with reference to the conveyance of sites to, and vesting the same in, Trustees for the Institutions, without the neces-

sity of fresh conveyances on every change of Trustees, and also to the holding of property generally. The following resolution was passed unanimously:—

"That it is the opinion of this meeting that an attempt should be made to amend the law with respect to Mechanics' Institutes, and Literary and Scientific Institutions, in order to give greater facility for the conveyance of the sites of such buildings, and for vesting the property in the hands of certain officers, with power of suing and being sued, and other formal powers."

A Bill for this purpose is now in the course of preparation, and will be introduced into the House of Commons shortly.

INSTITUTE BOOK ORDERS.

The subjoined statement shows the extent of the Book-orders for the last month, and is published in continuation of those given in No. 63 of this Journal, page 125.

JANUARY ACCOUNT.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Annan, Mechanics' Institute	7	13	0	5	13	2
Ashbourn, Reading Room and Literary Institute	1	1	0	0	15	11
Bakewell and High Peak. Institute	4	14	6	3	10	10
Cambridge, Philo-Union Literary Society	7	5	0	5	5	4
Cambridge and Cambridgeshire, Mechanics' Institute	4	4	0	3	13	6
East Retford, Literary and Scientific Institution	3	1	1	2	5	7
Gateshead, Washington Chemical Works Reading Institution and Library	1	11	10	1	5	11
Hampton (Middlesex), Literary Society	10	2	0	7	13	6
Halifax, Mechanics' Institution and Mutual Improvement Soc.	4	4	0	3	5	2
Hereford, Permanent Library	24	6	0	18	8	6
Leven, Vale of, Mechanics' Institution	17	12	0	13	12	5
Lincoln and Lincolnshire, Mechanics' Institution	2	3	6	1	12	5
London, Bank of England Library and Literary Association	28	19	0	22	10	6
London, Westminster Literary, Scientific and Mechanics' Institution	6	7	6	3	19	9
St. Ives, Institution	7	3	6	5	6	2
Sevenoaks, Literary and Scientific Institution	29	6	0	20	15	4
Shaftesbury, Literary Institution	12	7	0	9	2	6
Wirksworth, Mechanics' Institute	2	10	8	1	19	11
	£174	11	7	130	16	5

Showing a total saving of £43 15s. 2d., or an average discount of about 25 per cent.

The Council have much pleasure in stating that Messrs. J. W. Parker and Son have expressed their readiness to supply Institutions with books under this arrangement at reduced prices; also, that the proprietors of the "Irish Quarterly Review," and of the "Journal of Industrial Progress" (of which the first number appeared last month), will allow a considerable discount in the purchase of those periodicals.

FIBRE FROM PITCH PINE FIR.

The following copy of a despatch and its enclosures have been received from the Colonial Office:—

Government House, Nassau, Bahamas,
10th December, 1853.

MY LORD DUKE,—I have the honour to enclose for your Grace's information, the copy of a report made to me by the Surveyor-General of Lands, relative to the vast indigenous forests in this colony of that species of the "Abies" commonly known as the "Pitch Pine Fir."

2. The Surveyor-General estimates these forests at not less than 200,000 acres in extent; they are, however, singularly limited to four islands in the colony, viz:—Abaco, Andros Island, Grand Bahama, and New Providence.

3. This report was called for by me in consequence of a specimen of the fibre obtained from the spines or leaves of this species of fir tree having been deposited during the present year in the Nassau Museum, the larger portion of which was produced by the labour of prisoners. A specimen is herewith forwarded for your Grace's inspection.

4. I trust your Grace will kindly pardon any irregularity in thus bringing under your notice a subject not of ordinary official routine. A severe hurricane that occurred about the 22nd ultimo, has created much misery in this colony; the lower orders, as is usually the case in such visitations, being the greatest sufferers. This sad event adds much to the previously entertained conviction, that the labouring class in this colony suffer very much for the want of some additional staple on which to employ their industry, and hoping that a new resource may be found in the staple obtainable in these indigenous forests, I trust that in thus communicating with your Grace as the head of the colonial department on the subject, some advantage may accrue to the inhabitants of this colony.

5. I annex to this despatch a printed copy of a paper on the subject of the pine, which appeared in the *Nassau Guardian*, explanatory of its uses at Vienna.

6. When the art of obtaining it with the greatest facility, and in the manner best adapted for use, is fully known, and its value correctly ascertained, it may possibly eventually become an article of no inconsiderable export from this colony, and, if only as a matter of reference hereafter, your Grace may, possibly, not deem this despatch superfluous.

7. I avail myself of the present occasion to inform your Grace that I have this day received a letter from the United States Patent Office, dated Washington, September 9th, 1853, transmitting a copy of the reports of that office, upon mechanical and agricultural subjects, in which a trust is expressed that it will serve as a means of increasing the intercourse and strengthening the

friendly relations at present existing between the two nations.

I have, &c.,

(Signed) C. R. NESBITT,

Lieutenant-Governor.

His Grace the Duke of Newcastle, &c.

Surveyor-General's Office,
7th December, 1853.

SIR,—I have to acknowledge the receipt of your letter, No. 486, and in reply have the honour to state for the information of his Honour the Lieutenant-Governor, that extensive "Pine barrens" so called, are in the Islands of Abaco, Andros, Bahama, and New Providence. The probable extent may be estimated at not less than 200,000 acres. The pine tree is not found to any extent in any other island of the Bahama Government.

I have, &c.,

(Signed) J. J. BURNSIDE,

Surveyor-General.

W. H. Doyle, Esq.,
Acting Colonial Secretary.

(Extracted from the *Nassau Guardian*, 16th Nov., 1853.)

A NEW USE OF THE LEAVES OF THE PINE—(*Pinus sylvestris.*)

Near Breslau, in Silesia, in a domain called the prairie of Humboldt, there exists two establishments, as astonishing for their produce as for their union. One is a manufactory which converts pine leaves into a sort of cotton, or wool; the other offers to invalids, as curative baths, the waters used in the manufacture of that vegetable wool. Both have been erected by M. de Pannewitz, inventor of a chemical process by means of which it is possible to extract from the long and slender leaves of the pine a very filaceous substance, which he has named woody wool; it can be curled, felted, and woven. All the angular leaves of the pine-fir, and of the coniferæ in general, are comprised of a fibullæ, extremely fine, and tough, surrounded and held together by a resinous substance under the form of a thin pellicle. When, by decoction and the use of certain chemical agents, the resinous substance is dissolved, it is easy to separate the fibres, to wash them, and free them from all foreign substances. According to the mode of preparation employed, the wooly substance acquires a quality more or less fine, or remains in its coarse state; in the first instance it is used as wadding, in the second to stuff mattresses. If the pine has been preferred to other kinds of pitch trees, it is on account of the length of its needle-shaped leaves. * * * The tree can be stripped of its leaves when quite young, without any injury. The operation takes place when they are still green. A man can gather 200 lbs. of leaves a day. It was first advantageously substituted for cotton and wool in the manufacture of blankets. The hospital at Vienna bought 500, and, after a trial of several years, has adopted them entirely. It has been remarked, among other advantages, that no kinds of insects would lodge in the beds, and its aromatic odour was found agreeable and beneficial. These blankets have since been adopted by the penitentiary at Vienna, the charity hospital, and the barracks of Breslau. Its cost is three times less than that of horse-hair, and the most experienced upholsterer, when the wool is employed in furniture, could not tell the one from the other. The articles can be spun and woven, resembling the thread of hemp for its strength; it can be made into rugs and horse-blankets. In the preparation of this wool, an ethereal oil, of a pleasant odour, is produced. This oil is at first green; exposed to the rays of the sun it assumes an orange yellow tint; replaced in the shade it resumes its former green colour; rectified it becomes colourless. It differs from the essence of turpentine extracted from the same tree. It has been found efficient in rheumatism and gout; also as an anthelmintic in cutaneous diseases. Distilled it is used in the preparation of lac of the finest kind. It burns in lamps like olive oil, and dissolves caoutchouc completely in a short time. Perfumers in Paris use it in large quantities. It is the liquid left by the decoction of the pine leaves which has been so beneficial in the form of bath. The bath establishment is a flourishing one. The membraneous substance obtained by filtration at the time of the washing of the fibres is pressed in bricks, and dried; it is used as a combustible, and produces from the resin it contains a quantity of gas sufficient for the lighting of the factory. The production of a thousand quintals of wool leaves a quantity of combustible matter equal in value to 60 cubic metres of pine wood.—*Working Farmer.*

BATHS AND WASH-HOUSES FOR THE LABOURING POOR.

The following is a Return of the Bathing and Washing at the Public Baths and Wash houses in London, conducted under or in accordance with the Acts 9 & 10 Vic., cap. 74, and 10 & 11 Vic., cap. 61, and of a few out of the many similar establishments in the country, for the year ending December 31st, 1853:—

Name of the Establishment.	Number of Bathers.	Number of Washers	Total Receipts. £	s.	d.
METROPOLIS.					
1. The Model, Whitechapel	156,110	42,589	2,976	7	8
2. St. Martin's-in-the-Fields	156,418	46,337	2,607	6	10
3. St. Marylebone	155,827	37,061	2,498	2	3
4. St. Margaret and St. John, Westminster	111,392	66,644	2,204	13	5
5. Greenwich	61,782	8,815	995	11	4
6. St. James, Westminster	111,870	35,829	2,038	10	11
7. Poplar	41,490	10,714	646	15	10
8. St. Giles and Bloomsbury (*Opened June 30th*)	83,810	21,051	1,546	3	0
Totals	877,699	269,040	16,112	9	3
COUNTRY.					
Liverpool,—					
Cornwallis Street	98,460	......	1,561	3	2
Paul Street	44,747	11,480	797	4	4
George's Pier Head (*Opened May 11th*)	45,243	......	1,684	5	6
Hull	52,142	7,579	612	8	7
Bristol	40,262	11,065	580	11	2
Preston	29,296	10,376	446	10	5
Birmingham	98,396	5,547	1,[illegible]	14	5
Maidstone	31,221	5,773	348	8	10

The Return does not include the bathing and washing at the George-street and the Lambeth establishments, which are not regulated by the Public Acts.

The steady increase of the revenue derived from baths and wash-houses in London from the commencement of the undertaking in 1846, shows the practical utility of these institutions, and their effect on the physical and social condition of the industrious classes, viz.:—

	£	s.	d.
The aggregate receipts at nine establishments in the metropolis, inclusive of the George-st. establishment, during 1853, amount to	18,218	5	8
1852—Eight establishments	15,629	6	8
1851—Six establishments	12,906	13	5
1850—Four establishments	9,823	10	6
1849—Three establishments	6,379	17	2
1848—Two establishments	2,896	5	1
1847 / 1846 } Ditto	3,2[illegible]	1	5
Showing an increase in 1853 over 1848 of	£15,317	0	7

Another important fact is, that the receipts at the wash-houses above enumerated, during 1853, have been 4155*l.* 6s 8d., against 2449*l.* 19s. 5d in 1852; and the number of washers, 269,040 against 197,641; showing an increase of 1708*l.* 6s. 10d. in money, and 71,399 washers. In 1851 the aggregate receipts at three wash-houses then opened were only 609*l.* 19s. 4d., and the number of washers only 60,154.

These figures would seem to show that the public wash-house is steadily gaining favour among the working classes, and so regular is the increasing demand for accommodation, that the Boards of Commissioners of several of the existing establishments anticipate the necessity of extending their washing and drying accommodation.

An experiment of providing first-class washing departments has been made at the St. Giles' (Bloomsbury) Establishment, and the result has proved the necessity existing among many of the middle classes for such accommodation.

Nothwithstanding the marked success which year by year attends these institutions, there still appears a reluctance on the part of vestries to establish them; several parishes during the past year having rejected the motions made to provide public baths and wash-houses.

Experience has proved that in populous parishes the charge upon the ratepayers is trifling; and, in all probability, this charge will be more than counterbalanced by the improved health and social condition of the poorer classes, with the consequent lessening of the burden on the rates.

Probably ere long the establishment of public baths and wash-houses will receive attention from capitalists, who by erecting them on a large scale, adapted to all classes, will find it a profitable investment of capital. At present the accommodation of the poor only has been considered; but if higher priced, and more luxurious and medicated baths, be united with those at low prices, great commercial success might be expected.

Two establishments of baths and wash-houses are now in course of erection in the district of St. George, Hanover-square; and the works of another, in the course of erection by the parish of Bermondsey, are in a forward state.

CONFERENCE ON STRIKES AND LOCK-OUTS.

[Extracts from the Press.]

(From the *Weekly Dispatch.*)

In a letter signed "Caustic," and headed "Free Trade in Labour," the following observations are made:—

"I often hear of the impossibility of reaching certain classes, Parliamentary corruptionists, for instance, and feeling convinced, so that "fire cannot burn it out of me," that were there is a will there is a way, I always listen to such impossibility-mongers as cheats and impostors, determined to perpetuate the injury, never as statesmen who have sought the means of abolishing it. Supposing the working classes, on careful consideration, on the fair exhaustion of discussion, to be determined to give up combination for wages' regulation on their own part, I will answer for it that clauses could be drawn and introduced into the same Bill with penalties, rules of evidence, and temptations to afford it, that should make a body of masters as little likely to incur the risk of conspiring against their workmen's bread as of devising treason against the life of their Sovereign. If this difficulty be, as I believe it is, the chief objection, honest, energetic dealing in Parliament can remove it; and it will be at least wise to ask the question, whether it is not well to escape all the tyranny of a masters' combination, by yielding the power of counter-combination, which every protest of the workmen asserts to be much less offensive, and which the result of every strike proves to be so.

"Confine associations to their real object of mutual help. Mr. John Watts, in addressing the *Daily News*, gives an excellent instance of their proper purpose—to ascertain the rate of wages in every part of the country, and give that information to all the sections of the body, so that the eventually all-powerful law of supply and demand may be made immediately to operate in behalf of the workmen. Go further, I should say. Collect all the information as to prices of fuel and provisions, sufficiency or insufficiency of lodging, supply of water, health of the district; nay, for the many who would, I should hope, care about it, its social character. Many societies already do furnish the means of travelling to their members, when work absolutely fails in a particular place. Improve the hint; make reasonable advances to a member as soon as it becomes his interest to remove. Learn from the very necessities of Preston: carry his goods for him to his new place of work, correspond for his engagement there. If he is removed at the general cost, and never repays a farthing, he so far lightens supply where there is too much of it, and increases the value of the labour left. The moment, too, is propitious. That great tyranny over British industry, the law of settlement, is, according to the promise of the Queen's Speech, to be dealt with in this Session of Parliament. Such a repeal is the real complement of Free-trade; it is the poor man's true charter, and once armed with its rights, he will be able to carry his toil to every market, and demand its fair price, without a hindrance from the officials of a workhouse, as effectual as that which ties the person of a Russian serf to his owner's estate.

"I turn now to Mr. Leigh, the boiler-maker of Manchester, with his objections to the introduction of unskilled labour into factories, 'in order to get the skilful labourers to teach these men a business which they had undergone years of toil to obtain.' Now they ought not, nor ought any one, to undergo one hour of toil more than is necessary to obtain the knowledge, except to exercise it for their own profit; and, if it has really cost them so much time to gain it, so much must it cost the unskilled labourer. The skilled man may, of course, make his own bargain, as to whether he will teach or not teach. He is worth so much the more if he does teach. If one refuses, others will, at the utmost, charge for the extra trouble and impart their knowledge. For Mr. Leigh will allow that the art must be carried on by being imparted. And every one who has reflected on the subject will maintain that the bringing forward of all talent, making every possible use of it in every way, is the only method of keeping the monopoly of an art to a nation. Skilled, half-skilled, unskilled, each working his best, aided by machinery which cheapens production beyond any human power of combination, force the custom of the world to the place where all are unrestrictedly doing their utmost, command employment; and, as the return for such labour must come from foreign countries first in the articles most needed, here, as these articles must be brought to the seats of labour where the money is made to pay for them, so great markets, cheap and abundant, are built up, and every man's shilling buys half as much again as it would where labour is regulated and fettered, and can altogether raise but half the sum it ought to do to draw merchandise to supply its wants and comforts. Trades, in fact, ought, in their first principles, to be taught at schools; and, as all the people of this country ought to be employed—as the more of them are employed, the more sure are the rest of profitable employment—so the workers ought to be allowed to disperse themselves freely through the ranks of all industry, applying to that for which body and mind have best fitted them, as much for the sake of the community as for their own. This is Anglo-Saxon freedom: not the Prussian principle of monopoly, by which a poor seamstress may not make a silk gown for a lady, because it is a tailor's privilege to measure her for it; not the Indian cast service, by which the man who fans his master would see him die for a draught of water, because it is the business of some other person to fetch it.

"The one resolution come to is a very wise one, the claim that partnerships shall be instituted with limited liability. I have no doubt that such a reform may be made the means of bringing forward many an enterprising and able, though penniless, man. But it will do yet more for the body of workers, even supposing they should not be able to get the assistance of capital by partnership for their own combined enterprises. It will bring the natural competition of capital fully into play in their favour. Great enterprises will be undertaken upon joint-stock principles, and the workers will have yet more customers, more bidders for the article they have to sell. It is impossible to do right in one way without contributing to do right in another; and it may prove to those who are determined to consider capital and labour as antagonists, what close and inseparable allies they really are, when it is impossible to give capital its full rights without instantly compelling it to do more good to the labour it must hire to become itself profitable. Genius, deep thought, enterprise, energy on the one hand—diligence, sobriety, honesty, frugality on the other—are all fellow servants in one glorious cause; and he does what he can to blight the best chances of humanity who would sow one thought of needless discord in a family that must perish by separation."

(From the *Atlas*.)

"It was also apparent that the social standing of the working classes is at the bottom of the whole question. They are conscious of occupying a degraded position in our social arrangements; and more than one speaker alluded to the offensive manners of the Preston employers, which entirely precluded the possibility of a friendly discussion of the matter in dispute. Very likely the masters would tell a similar tale, and there is probably truth on both sides. With the awful gulf that separates the rich from the poor in our very Christian country, it is not to be expected that our working men should assert their rights, or supposed rights, with all the amenity that could be desired; and when a clever sensitive artizan is asked to behave with humility in the presence of wealth that is ignorant and rude, we cannot wonder that anger and antagonism should be the uppermost feelings in his mind. We are told that when employers are gentlemen, matters go on comparatively smoothly; but when they are only capitalists in a state of unreclaimed savagery, that bitterness of spirit is engendered which we must all so deeply deplore. The fact is that we have so long neglected national education, that we have on the one hand a large body of men who have learnt that they are oppressed and degraded, but we have not learnt the true remedies for the grievances under which they suffer; while, on the other hand, we have a great many employers who are called upon to govern a number of their fellow-citizens, and who are utterly destitute of the natural qualities that are essential to make efficient captains of an industrial regiment. It is, in fact, a fight for supremacy between manhood and money, and the struggle will go on until we have raised the condition of labour, and taught property to attend to its duties with as much energy as it claims its rights. We must bridge over that gulf which separates the capitalist from the labourer; we must cultivate in both the same human faculties, and by giving the poor man every encourgement to become, be it on ever so small a scale, a capitalist himself, do away with the antagonism that now exists.

"The conference had its full share of political economists, and they justified CARLYLE's nick-name of "professors of the dismal science." They had the usual shibboleth of supply and demand, and dogmatised right owlishly upon every point in debate. It never occurred to them that there are endless disturbing circumstances which prevent a simple solution of any social problem. They forgot altogether the element of time, and the thousand causes which prevent wages finding their level, or capital rising or sinking in its value as compared with labour, as they would do if there were perfect freedom of motion throughout our social and commercial systems. They also ignored the whole moral elements of the question, and never considered that if a labourer must in the long-run be paid enough to keep body and soul together, national habits determine how near this point of extreme degradation it is possible to depress them. They altogether forgot that there is a margin between the amount of profit which makes the employment of capital barely remunerative, and that which capitalists are in the habit of receiving; and that moral elements must operate in determining what share of such margin of profit will content the capitalist and what share will content the labourer. Saying the employer can only pay what he can afford, and that the labourer must work for what he can get, does not give us any clue to ascertain how much the one can afford or the other obtain. A general contentment on the part of labourers, with a very low condition, would enable the capitalists to depress wages to a point approaching to that of starvation, while a general determination of labourers to improve their condition tends to force capitalists to be content with a minimum of profit, beyond that which is absolutely necessary for the safety of their investment. Political economy is very well in its way, but it must not presume to solve problems that are beyond its reach, and which belong to the far wider domain of Social Science—a science of which the first lines only begin to appear."

(From the *Examiner*.)

"Tribunals of commerce and Courts of wages' arbitration are impertinences. Nobody asks for either; and, if offered, nobody would except either. What commerce and industry require is simply not to be interfered with. And when disputes arise, why—as Mr. Bright remarked at Manchester the other day, in anything however but the spirit of a Quaker—"they must be *fought* out." *A mode of solving difficulties which Mr. Bright would rather inconsistently deny to nations.*"

Home Correspondence.

STRIKES AND LOCKOUTS.

SIR,—I hope that the efforts of the Society to find a solvent for the difficulty of strikes and lock-outs has not terminated with the late Conference; the immense importance of the subject requires that we should stick to it; while our position as the oldest and most powerful voluntary Association connected with the industry of the country justifies us in doing so.

I entirely agree with Mr. Adams in thinking that the Conference has been productive of good results. The temper and calmness by which the discussion was characterised, the good sense and ability displayed by nearly all the speakers, the indication of remedies hitherto either unnoticed or rejected, the unanimons resolution in favour of limited liability in the law of partnership, all these things are clear advantages gained, without any painful compromises on either side, or any suspicion of bias on the part of the Society. It is now demonstrated that the leaders of the operative classes are not afraid to trust their cause, upon neutral ground, to the test of dispassionate logic. That surely entitles them to a patient and considerate hearing, and to exemption from irritating imputations upon their motives. Much of what they said might be wrong, but they represent ideas and sentiments prevalent amidst a very large number, if not a majority, of the working classes. Those ideas have been pursued through many mistaken agencies, through conspiracy, riot, and violence; softening year by year, until the issues involved are at length raised with due formality in the court of reason. Let us not set our faces or harden our hearts against them in this state of the case, remem-

bering that they who "appeal to Cæsar" provoke the highest penalties if their suit is cast.

Employers, as a body, were not numerously represented at the Conference, and their side of the question, though ably stated by several speakers, did not receive that full and copious elucidation to which it was entitled. The letters from Mr. Oldham Whittaker, and from Mr. Joseph Hibbert, published in last week's Journal, show how this arose in the case of the Associated Millowners; nor does it seem unreasonable to infer that the masters in other trades were actuated by similar motives. They have, however, deprived themselves of the power of complaining if their cause is damaged by the proceedings of the Conference. The Council of the Society cannot be blamed, for its position was one of strict neutrality; and on this point I may express my surprise that Mr. Oldham Whittaker should have misconstrued its invitation into an offer to arbitrate. Mr. Hibbert does not fall into that error, but he predicts that the Conference would be "a scene of mutual complaint and reproach"—a prophecy which, happily, was not fulfilled. It seems difficult (I maintain impossible) to understand how masters, who are themselves associated, can consistently refuse to recognise among their men an organization, the principles of which they have *de facto* accepted. If both are combined, both stand on an equal footing, and why, therefore, this squeamishness about meeting? Some may think the millowners and masters generally were afraid of having their cause removed from the protection of those stern necessities which supply the labour market. I do not entertain that view; but had they been present they might have met the allegations,—that they are not conciliatory to their operatives, that they deal with them as a body and not as individuals, as "hands" and not as men. They might have successfully controverted the prevaling sentiment of the Conference,—that a lock-out is a barbarous and unjustifiable expedient for meeting partial strikes; and perhaps the startling statements of Mr. Hindley, with reference to the present dispute at Preston, might have been contradicted or qualified. There are two associations at Manchester, one called "the Central," the other "the General Association of Masters," within one or other of which are comprehended the local Masters' Association of all the cotton manufacturing towns, Blackburn, I believe, alone excepted. These two gigantic combinations were not represented at the late Conference, or it would have been curious to hear their existence reconciled with the following observation made by Mr. Henderson, of Fox, Henderson, and Co.:—

"Whilst I may excuse combination on the part of the working classes, I can form no excuse for a similar combination on the part of the employers, because they have it all their own way, and have it in their power to inflict an enormous amount of injury, and cannot do it without inflicting it upon those who are not guilty, and are not parties to the strike."

It would be easy to point to other serious questions raised during the discussion, upon which the Lancashire masters, had they been represented, might have thrown useful explanatory light. The Conference felt and expressed regret at their absence, but it managed, nevertheless, to find its way to a good deal of the truth without them. It is now clear, and was admitted on all sides, that there are disturbing causes, arising from imperfect legislation, which prevent the harmonious, equable action of those relations that ought to exist between capital and labour. Mr. Slaney took up this position at the outset of the discussion, and it was convincingly enforced by Mr. Edwin Hill, Mr. Anderson, Mr. Gillinder, Mr. Pare, and other speakers. We have poor-laws, currency-laws—laws affecting property, revenue, credit, hiring, apprenticeships —laws, in fact, influencing in a thousand ways the stock of labour and capital in this country, modifying, therefore, extensively the terms on which one man sells his labour and another buys it. We have also the operation of trade customs, often founded on a wrong principle, acting in the same direction. These laws and customs, so far as they are just, will not place either the employer or the employed at a disadvantage in the labour market; but if they are unequal in their operations, the pinch will be felt on the one side or the other. The abuses of the old Poor Law, which were a bonus upon improvident labour, told heavily in their time against the true interests of the working classes—the Law of Settlement, which has so long condemned a large portion of our agricultural population to a state of hopeless and degraded helotry, still lingers on the Statute Book. It required the force of a great famine, a stupendous emigration, and a wholesale Encumbered Estates' Act, to break through the barriers of a vicious system, and place labour and capital *en rapport* with each other in Ireland. Here, though to a modified extent, similar evils, attended by similar curative processes, are in actual operation. The tide of English emigration has not swelled to the magnitude of an Exodus, but it possesses considerable strength already, and a new continent, with gold fields and other untold sources of wealth is in the market, competing with our own employers of labour. We escape famine by free trade; but consider how that remedy, by expanding our commerce, increases the demand upon the available labour, supply, and capital of the country. We have not an Encumbered Estates Act, but we are endeavouring to provide facilities for the transfer of property, and the measure has been advocated by a writer whose opinion is entitled to great weight. Take again the existing law of partnerships—What is that but a legislative attempt to protect capital, which the common sense of the Conference unanimously condemned as a failure. Not only is capital not protected, but labour has its fair chances in the market diminished thereby; and we carefully close, with an Act of Parliament, one of the safety valves through which the bottled-up spirit of combinations could most harmlessly and legally expand itself. In America strikes are unknown. If you ask Mr. Whitworth, who has studied the matter carefully, I have no doubt that he will explain this fact to you by pointing to the law of limited liability in partnerships which prevails in the States. Let me touch on another point, to the importance of which the *Weekly Despatch* has evidently had its eyes opened by the Conference. We know that the corn market has been exposed to excessive fluctuations, and much loss, mischievous speculation, and uncertainty, produced from the want of agricultural statistics. Now, granting that labour is a mere commodity, as the political economists tell us—subject to the same law of supply and demand as wheat, or barley, or flour--what statistics do the labouring classes possess by which they may be able to bring their labour to the best market. The present public returns afford no such information; and the extended facilities of the age for changing from place to place, and from employment to employment, facilities which to the operative should be an inestimable boon, are almost entirely lost to him.

Feeing all this vaguely, while no light is held up to guide them, and they are penned up in helpless masses, like sheep, is it to be wondered at that the working classes combine? To the operation of the law of settlement I have already referred. Its repeal will, no doubt, exercise a most beneficial influence; but I refer to it now as a decisive evidence of the absurd and profitless manner in which the labour question, as it is called, has hitherto been discussed. The Conference enabled persons of the most ordinary penetration to see, that to refer the working classes to the abstractions of political economy when great disturbing forces are at work, the pressure of which they have to sustain, is an outrage upon their feelings, and a gross insult to their common sense.

Let us give up, then, the useless denunciation of unions and agitating delegates, and address ourselves henceforth to the consideration of what should be done to secure the harmonious and equable operation of that general law of supply and demand, the violation of which, by bad or

defective legislation, throws employers and employed alike upon the clumsy expedient of combination.

As long as there is "something rotten in the state of the labour market," all the argument and abuse in the world will not dissolve one Trades union, or "double up" a single delegate. Counter movements of masters' associations only strengthen the organised resisting powers of the men; thus establishing as a truth the apparently paradoxical position, that combinations live by the very means taken to destroy them. What excellent case and high feather William Newton appeared in at the Conference. His society is again accumulating a large fund; and the master engineers have abandoned, one after another, the solitary condition which they at first attempted to impose upon their men. They gained some points of importance in the interior regulation of their shops by the struggle; but one thing they could not do—they could not kill the Society of Amalgamated Engineers or extinguish Mr. Newton. Now what does this prove? Does it not satisfactorily establish that an active combination of masters is not the proper weapon wherewith to fight a combination of men. That cannot be called a strictly defensive combination which resorts to a lock-out. At some time or other the gates thus closed must be opened again, and the machinery thus stopped set in motion, whereas meanwhile the masters are in the position of *eggressors*. Public sympathy, right in its instincts, will always support a body of workmen whom their masters are openly trying to *starve* into terms of surrender. Single strikes are disastrous to a union, because "it loses the shops" where they take place; general strikes are quickly terminated by the manifestly aggressive position of the operatives, and the consequent failure of public sympathy; but a lock-out, following partial strikes, even where these are intended avowedly to take the masters in detail, is a barbarous appeal to the force of hunger, misery, and want, which defeats its own object by the feeling which it excites, and which unites the whole operative class in subscribing to resist such oppression. I own to a sense of humiliation when such acts are not denounced by the press—when turning 20,000 industrious operatives into the streets is slurred over as a private squabble by men affecting a character for statesmanship. Common sense tells us that there must be a great absence of the true master spirit where such a state of things arises.

To probe this part of the labour question to the bottom was no doubt one of the chief objects which the Council had in view in holding the conference; for I think I can trace through its prospectus of topics a desire that the discussion should take that direction. The prospectus raised in the first place the question of combinations, with the view, apparently, of ascertaining how they could either be rendered "unnecessary," or "controlled," or "neutralised." It then invited an expression of opinion upon the policy of lock-outs, and whether any other means could be adopted for terminating partial strikes. The conference agreed unanimously that a law of limited liability in partnerships would tend to render combinations unnecessary. I hope I have shown that there are other measures which would be likely to produce a similarly beneficial effect, and which, though not prominently brought out, were yet indicated with sufficient distinctness in the course of the discussion. These improvements, which the progress of the nation may be expected gradually to realise, are, however, very far from exhausting the possibilities of this subject; and I may be permitted to suggest, as an illustration, the effect which would be produced by arrangements ensuring publicity to the proceedings of combinations, whether on the parts of masters or men. It must have struck every candid observer of the phenomena of combinations how *secresy* on one side begets *suspicion*, darkening into hostility, on the other: and how much good a little mutual confidence would effect. Would it be difficult, in the constitution of trades' unions on the one hand, and of masters' associations on the other, to provide guarantees for that publicity which, in the interest of the community, it is so desirable to secure.

The trades' unions are now ramified through our whole manufacturing system, and, whether recognised or ignored by employers, unquestionably the employed support them with undiminished confidence. How they pass from their proper objects as *benevolent institutions* to organised strikes and breed contention between labour and capital, it is not very difficult to conjecture; but surely in the intermediate stages between these extremes there is ample time and opportunity for the exercise of conciliation and the influence of prudent counsel. Again, with reference to the masters' associations, it is absurd to say that these are not permanent bodies, or that *practically* employers are not committed to the principle of combination almost as much as the men. When the question of wages is not involved these bodies remain in a torpid state, it is true, but the moment their machinery is required it is in action. It is this mysterious semi-dormant constitution, coupled with the secresy and the unexpectedness of their proceedings, which has fixed in the minds of the operative classes a settled conviction that their masters are associated in a permanent conspiracy to depress the value of their labour. A more injurious suspicion to those entertaining it—apart from its actual injustice—could hardly be imagined; and it seems surpassingly strange that no pains has been taken to dissipate a prejudice so unfounded.

Taking all these facts and arguments together, it will, I think, be admitted that the Council adopted a judicious course in drawing the attention of the Conference, at the outset, to the consideration of the means whereby combinations, either of masters or men, might be rendered "unnecessary," or be "controlled," or neutralised." Assuming, however, that in the various suggestions thrown out, no effective protection is provided for capital against the coercive power of organised labour, what, then, should be the policy of the employers. That was the second issue raised by the Council.

General or single strikes they probably thought it unnecessary to discuss, for reasons which I have already explained, so that the question came to be, how partial strikes, intended to take the masters of a locality in detail, should be met. The Conference arrived at no unanimous conclusion, but the expedient of a "lock-out" was generally condemned, and the reference of disputes to Courts of Arbitration or local Boards of Trade as generally approved. It does seem strange that gigantic Combinations of masters, which have conceded the principle of association by themselves adopting it, and which have nothing to fear therefrom, should, nevertheless, steadily reject this mode of settlement. Were they acting as individuals, and not banded together by heavy penalties, one could understand their conduct; but when it is notorious that they have their regular meetings, their secretaries, their chairmen and treasurers, their rules and regulations; when everybody in Manchester knows that they have been recommending "short time" and a general diminution of wages; that they are backing up the Preston millowners by a levy per horse power, what earthly excuse can they have for refusing arbitration? Mr. Oldham Whittaker rebukes the Society of Arts for proposing to do what it never contemplated. But supposing the Society properly qualified to arbitrate, I cannot see why he should object to that mode of settlement. His letter, therefore, contains two blunders, one in fact, and the other in argument. I, however, pass over this. I am sure that if the manfacturers of the North are reduced this time to play the part of the "Dog in the manger," they will profit by the experience of that absurd position, and, when the next emergency arises, think twice before they resort to a "lock-out." Had the masters of Preston confined their counter movement within the narrow basis of the six mills out on strike at the commencement, instead of extending it to the whole town, they would have deprived the operatives of that support and sympathy which they have so abundantly received. We should, indeed, in the weekly sub-

scriptions of the operatives, have lost one of the most remarkable manifestations of chivalry among the labouring classes that the nineteenth century has witnessed; but, as a compensation, the prosperity of a large manufacturing community would have been preserved, much privation and misery avoided; and animosities and heart-burnings effectually smothered, which now it will take years to extinguish.

When partial strikes are attempted, the proper, the rational, and the temperate way to meet them is, to bring in a fresh supply of labour, wherever it can be obtained, even if it is requisite to go abroad for that purpose. The existence of such a supply at once proves that the masters are justified in resisting the demands made; and however long the contest is maintained, it must come to that issue at last. The master engineers had heavy experience of this truth, for the time came when they were obliged to open their shops, and once more to make up their establishments. That was a long and tedious process, occupying in some cases a year to accomplish; and I am told that the arrears of work thus accumulated have hardly yet been overtaken. As I write the mill-owners of Preston are paying tardy homage to the same necessity, and once more opening their mills. That act at once puts them in an improved position with the public; and, whether it be the result of the late Conference or not, there can be no doubt that it is the first really damaging blow struck at the combined attitude of their work-people.

On the third head of discussion included in the programme of the Council, the Conference had not time to enter; and as this letter has already extended to too great a length, I shall not venture to examine it minutely on this occasion. The subject of wages, however, as an element in the present aspect of the labour question, is one of primary importance. As long as a scale of remuneration for work is maintained in a country inadequate to supply the physical and moral wants of the humble classes, all the philanthropic zeal of their superiors, the direct interpositions of the legislature, and the ministrations of religion, will make no impression upon the mass of barbarism, misery, and crime thus inevitably engendered. The due reward of labour ought to cover the cost, not only of animal existence, but of civilised maintainance. It is to that theoretic standard that, through the defective mechanism of combinations and strikes, the operatives of this country are earnestly striving. Can any patriotic and disinterested mind regard their efforts, day by day tempered by increasing wisdom and intelligence, without a feeling of sympathy. To their aid has come a power—first treated as an enemy, soon to be welcomed as a friend—the power of machinery; which is rapidly changing the whole economy of social life by emancipating mankind from the drudgery of the lowest forms of labour. I wish from my heart that we had in this country a system of education worthy of a people so pre-eminently industrious, that we might set these things aright. We should not then have so many of the intelligent classes, and of the leading organs of public opinion, arraying themselves with the strong against the weak, and aggravating their want of generosity to the poor by their blindness to the true interests of the community at large.

A

NATURE PRINTING.

SIR,—Will you allow me, through you, to communicate to the Society of Arts what I believe to be a step in advance in the art of Nature Printing. Since I had the pleasure of seeing you in London, in December last, I have been making experiments, in the hope of being able to dispense altogether with the electrotype process. I have tried various mixtures of metals with the view of obtaining a combination sufficiently soft to receive an impression of the object, and yet sufficiently hard to allow of proofs being taken from the impression by a copper-plate printing press. The best quality of Britannia metal, to a great extent, fulfils these two conditions, and I send you some specimens printed from Britannia-metal plates. The object to be engraved is placed between two *highly-polished* plates of Britannia metal, and the plates are then passed between a pair of steel rollers, the pressure being so adjusted as to bed the plant in the metal without rolling out the plates. When this is carefully done, an impression of the object may be obtained without injuring in the slightest degree the polish of the plates. An impression thus produced is more delicate and beautiful than an impression taken in lead. Every hair on a leaf gives an impress to the metal sufficiently deep to print with the utmost delicacy, and if you will have the goodness to examine with a lens some of the accompanying specimens, you will fine the most minute hairs to be delineated with an accuracy only to be equalled by a photographic picture. A Britannia-metal plate thus obtained gives a perfectly clear impression, and will even admit of a considerable number of prints being taken from it without injury. As Britannia metal is the foundation of the "step in advance," which I more particularly wish to bring before the Society of Arts, I have written at some length on the subject. Believing it possible to transfer an impression from the Britannia metal plate to stone, I consulted skilful lithographers, and was told the idea was perfectly impracticable. Having, however, carefully examined with a lens the texture of the impression, I was satisfied it possessed a character somewhat similar to that imparted to a lithographic stone by the process technically termed "graining," and resolved to let experiment decide the question. The result surprised the printer and gratified me, and proved the practicability of printing thousands of impressions without the intervention of the troublesome and costly electrotype process. The lithographic impressions forwarded with this communication are first attempts printed in black ink; had they been printed with all the variety of tint attainable by the chromo-lithographic process—and it is perfectly possible—they would, indeed, have rivalled nature herself, and far surpassed any attempt at colour-printing from a copper-plate. I have not seen any account of "lithographic nature printing." If it has been attempted the "transfer" must have been taken from an electrotype plate, and consequently after the expenditure of much cost and trouble. The process now described—rapid and cheap—altogether avoids the necessity for an electrotype, and affords a means of spreading far more widely the advantages of Nature Printing.

Very faithfully yours,
FERGUSON BRANSON.

Sheffield, Feb. 4, 1854.

PATENT RIGHT.

SIR,—At your invitation I attended the discussion on Patent laws, last Wednesday evening, but owing to the adjournment I had no opportunity of saying what I had intended to say. I find that I cannot go up again next Wednesday, and therefore I must ask you to let me once more occupy a small space in the columns of the "Journal."

A very few remarks upon the discussion, so far as it went, will serve to introduce my views of the Inventor's true position and his rights.

It seemed to me that Mr. Webster, in advocating the Inventor's cause, relied mainly upon two analogies; 1st, between the right of Property in designs and inventions, and the right of Property in material things; 2nd, between Patent right and Copyright. Now, however ably it may be handled, analogy is always an unsatisfactory kind of argument. It is indeed little better than illustration, and seldom serves to establish anything more certain than a probability. As commonly used it is only a variety of the *tu qu que* argument. Thus, the property man says to the patent man, "Your title is not good." The patent man replies, "It is as good as yours, for it *resembles* it

thus and thus." To this the property man rejoins, "It is *not* so good as mine, for it *differs* from it thus and thus."

So again with the analogy between Copyright and Patent right. For every resemblance put forward by Mr. Webster on one side, Mr. Denison can find a difference on the other; for, except in the most elementary questions, it is generally quite as easy to discern points of difference as to find points of resemblance, and so the analogy settles nothing.

With all respect and gratitude to Mr. Webster for his able essay, it is nevertheless clear to me that if the Inventor is to establish his claim he must argue otherwise than thus, and in saying so I do not admit that Mr. Denison and those who hold with him have at all shaken the foundation of that claim, for I do not give them greater credit for their differences, than I allow to Mr. Webster for his resemblances.

The advocate of the Inventor's right to remuneration for his intellectual labours, can afford to rest his case on its own merits without endeavouring to tack it to some other similar case, such as Copyright, which both parties may have agreed to admit as established.

As matters stand at present the Inventor has a natural right, a social right, and a legal right. The first is individual and inevitable, the second is relative and necessary, the last is a matter of expediency. I suppose no one will deny that a man has an inalienable right to his own thoughts; they are his inevitably by reason of the natural constitution of his mind, and cannot by any possibility be taken from him without his consent. Invention, in its primary sense, is thought, that is to say a thought resulting from a combination of other thoughts, and cannot belong to any other person than the thinker of it. If it is not his, it cannot be any one else's, for unless he choose to reveal it, no one on earth will be aware of its existence. This is enough, and more than enough, to establish the natural right, but it must be admitted, that as between the inventor and the public, nothing has been done at this stage of the inquiry to justify a claim for recompense. The inventor at this point is in the position of those men of abstract science who, loving it for its own sake and for the amusement it affords them, do not make any public use of the results of their researches, and therefore do not receive, although they sometimes claim, honour and reward at the hands of society.

The *social right* of the Inventor is his stronghold. It is very important in this inquiry to bear in mind the distinction between absolute right and relative right. Society is a state of existence resulting from innumerable concessions and compromises, some of which may not be defensible upon the principles of absolute justice, but at the bottom of all there are certain primary concessions which, whether just or otherwise, are found to be *necessary* to the maintenance of the principle of human association. These primary concessions were antecedent to law, and are assumed to be the foundation of it. By them such questions as that which we are now considering must be judged. Let us, then, trace out historically so many of them as are necessary for our present purpose.

At a very early period of the world's history men found it expedient to concede a portion of their personal independence, and to form associations for mutual convenience and safety. Almost equally early must have arisen the idea of property. The strong and energetic acquired the best of the productions of surrounding nature, and the weak and the slothful allowed them to retain that which they could not, or cared not to, take from them.

Out of the idea of property, and the varying desires of the mind or from the necessities of existence, arose the principle that one kind of property might be exchanged for another kind of property, and from the necessity of combined labour to the fructification of such property as at first existed, arose the idea that a portion of the property of one man might be exchanged for a portion of the labour of another.

From this rough sketch three principles may be traced, corollary to the fundamental one of human association, or "society," viz.,

1. That of property.
2. That of the exchange of property for property.
3. That of the exchange of property for labour.

These are sufficient for the Inventor's argument. His claim is for "work and labour done." Labour is in itself an intangible thing, whether it be hand labour or head labour. Its results only are visible. But it is not therefore a less valuab'e commodity. Labour is not property, but something which may be exchanged for property. This as regards hand labour is so evident that no one would think it just to require the labour of another without giving him an equivalent. With regard to the labour of the mind, as applied to design and invention, the case has been less clearly perceptible though not in reality different.

In a rude state of society, when each man makes for himself all the things of handicraft that he requires for his own use, it is very clear that any skill in invention or design that he may bring to bear upon the articles he fabricates will be for his own sole use and benefit, and there can be no question as to his right.

In a more advanced state when man exchanges his productions for other commodities, or that which may be used to represent them, he still derives benefit from his inventive skill in the enhanced price of his wares, as compared with others ruder in design or less skilfully adapted to their intended purpose. Still no one can question his right to such enhanced price, and to admit it is to say in effect, that in valuing any fabricated article, part of its value must be placed to the account of the labour employed upon it, and part to the inventive skill of the maker.

In a still more advanced state, another principle rises to view, that of the sub-division of labour. We then find that the inventive labour and the manual labour frequently become allotted to different persons, and from what has been said it seems reasonable to conclude that he who makes an article should receive the hand-worker's portion of its value, and he who furnishes the inventive skill should receive the inventor's portion.

If the manufacturer be also the inventor he clearly has a right to both shares; if he use the invention of another he is in justice bound to give up to him the inventor's share, that is to say, the portion of the price of the article produced, over and above the cost of hand labour and material, and a fair proportion of profit thereupon. Thus the inventor may be said to have a *social right* to derive benefit from his mental labour.

The large amount of invention which has been given up for public use by the lapse of the inventors' claims by death or otherwise, perhaps centuries since, is probably one cause of the unwillingness to pay distinctly for recent invention; another cause is the comparative lateness of the period at which the claims of inventors have been put forward. It is not till manufactures are carried on on a large scale, that questions about copyright and inventive right arise. Hence, it was not until books were manufactured by wholesale, by means of the printing-press, that copyright came to have a distinct value; so also is it when manufactures become extensive—till the home-workroom is exchanged for the factory, and labour is subdivided—that questions about the rights of invention arise; and thus it is that patents to secure to inventors that which is their social right were unknown till within a recent period, when it was found that the efforts of inventors to secure themselves were operating injuriously to the progress of manufactures, and consequently to that of society.

The inventor who is also a manufacturer has at the first, in all cases, an evident advantage over the manufacturer who is not an inventor,—an advantage which the

latter does not like to allow; hence piracy when the invention cannot be concealed. But if the inventive manufacturer can secure his invention to himself by secrecy, he may, if he please; or for competitive advantage, sink his claim to remuneration for his mental labour, and make his articles for such a price as will pay for hand labour and material, and leave him a fair business profit,—and no one can question his right to do so. Here, however, it is seen that although the public may derive temporary benefit from the invention, it may lose that benefit if the secret should die with the inventor; or, it may happen (as I have shown in my former letter) (a) that inventions may be lost to society for want of sufficient inducement to their originators to take pains in bringing them into use. Against such events society should, as a matter of expediency, protect itself, and it can only do so consistently with justice by giving to the inventor a *legal right* to receive in property, or that which represents it, a suitable remuneration for his mental labour. This, in a clumsy way, it is true, it has given by letters-patent from the king for each specific invention, which, whatever may be said against them, at least acknowledge the natural and social rights of the labourer in the fields of invention, and are, therefore, founded on principles of justice,—the patent granted, the law regards it as property, and treats it as such. I need not say more than this to show what the inventor's *legal right* at present is. Mr. Denison and other "law-men" know a great deal more about it than I do. They may find as much fault as they please with its details, but while I believe that it is essentially just, they must not expect me to admit that in this way they can make out a case for its abolition. It is incumbent on them to show its defects with a view to their amendment, and it must be remembered that, whilst its principles are nearly as old as the hills, the law itself is of but recent origin. When it shall have been bandied to and fro between St. Stephen's and Wesminster Hall as long as common law has been, no doubt it will become equally perfect. Pity that there is not a speedier way of arriving at legal perfection! Thus, as briefly as possible, I have endeavoured to show that the inventor has a *natural* right, a *social* right, and a *legal* right. I have purposely abstained from tracing the inventor's claim to remuneration in the varied forms in which, from the nature of things, it presents itself in a high state of civilization.

Everything in morals is best understood in its most elementary form. It is easier to see the relations of mind-work and hand-work in the simple case I have cited than in a more complex state of things, in which to accomplish the final result—the finished article. One man contrives it, another invents a process in its production, another a tool to make it, another designs its ornamentation, and others supply the materials and manual labour, although it is as certain in this case as in the simpler one, that every one of the persons engaged has a right to remuneration for his portion of the labour.

It rests with lawyers and law-makers to show how this can be arranged with equal justice to all parties; but in all legislation on this subject, the original creative mind, which sets all other minds and bodies to work, must, in justice as well as expediency, receive the first consideration. Mental labour of all kinds should be paid for, but there are different kinds of mental labour, and therefore there should be a graduated scale of remuneration. Lawyers should be the last persons in the world to object to separate and distinct payment for brain-work. They find no difficulty in distinguishing between it and hand-work in their own case, making one charge for drawing the deed, and another for engrossing it. As to an opinion, which is, strictly speaking, the only thing the lawyer invents, for that, perhaps, he should be paid *quantum valeat*, but he has contrived in all cases to get allowed a good set sum for it.

Yours faithfully,

JAMES ROCK, Jun.

Hastings, Jan. 30, 1854.

(a) *Vide* Journal of the Society of Arts, vol. I., page 538.

To Correspondents.

Erratum.—In last number, page 177, col. 1, line 30, for "*Mr. Hasler*, having, &c.," read "*Mr. T. Ashton*, having, &c."

*** The Secretary having learned that in several instances members have been charged one penny postage for the Journal, begs to state that no such charge should be made, and that in all such cases he would thank members to complain direct to the Post-office authorities on the subject, taking care to enclose the wrapper of the Journal on which the charge was made. Journals sent by post to members residing within the three-mile district are invariably posted *beyond* that limit.

MEETINGS FOR THE ENSUING WEEK.

Mon. London Inst., 7.—Dr. A. W. Hofmann, "On Organic Chemistry."
Geographical, 8½.—1. Colonel Lloyd, "On the Cerro de Pasco and its Silver Mines." 2. Letter from Mr. Amos Scott, "On Western Australia." 3. Capt. Sturt, "On the proposed North Australian Expedition under the Command of Capt. Stokes."

Tues. Royal Inst., 3.—Prof. Tyndall, "On Heat."
Syro-Egyptian, 8½.—Dr. William Camps, "On the State of Medical and Surgical Knowledge amongst the Egyptians at the Time of the Exode, from a Berlin Papyrus."
Civil Engineers, 8.—Mr. A. C. Hobbs, "On the Principle and Construction of Locks."
Medical and Chirurgical, 8½.
Zoological, 9.

Wed. London Inst., 7.—Conversazione.
Society of Arts, 8.—Mr. W. C. Aitken, "Ancient and Modern Metal-working and Ornamentation; with some Allusion to the newly-discovered Art of Nature Printing."
Microscopical, 8.—Anniversary.

Thurs. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
Antiquaries, 8.
Royal, 8½.

Fri. Geological, 1.—Anniversary.
Architectural Assoc., 8.
Royal Inst., 8½.—Dr. J. Conolly, "On the Characters of Insanity."

Sat. London Inst., 2.—Mr. E. W. Brayley, Jun., "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-Metallic Elements."
Medical, 8.
Asiatic, 8½.—Mr. S. E. Rolland, "On the Mountain Road to Mossul, between Diarbekr and Jezirah."

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, 3rd February*, 1854.]

Dated 25th October, 1853.

2468. M. Davis, 5, Cloudesley square—Treatment of fibrous materials other than flax and hemp. (A communication.)

Dated 22nd November, 1853.

2707. E. Briggs, Castleton Mills, Rochdale—Weaving pile fabrics.

Dated 28th November, 1853.

2773. J. Lord, Farnworth—Ladies' underclothing.

Dated 29th December, 1853.

3019. J. W. Crossley, Brighouse—Surface finish to fabrics.

Dated 30th December, 1853.

3023. W. Pickstone, Radcliffe, and J. Booth, Pilkington—Looms.

Dated 31st December, 1853.

3039. J. Bernard, 15, Regent street—Stitching and ornamenting various materials, &c.

Dated 5th January, 1854.

27. J. Mason and L. Kaberry, Rochdale—Preparing wool, &c., for spinning.

Dated 12th January, 1854.

81. L. J. Anger, Paris—Metallic tubing.

Dated 13th January, 1854.

87. W. Eassie, Gloucester—Railway trucks.

Dated 14th January, 1854.

92. J. Newman and H. Jenkins, Birmingham—Spoons, table forks, &c.

Dated 17th January, 1854.

107. W. Crosskill, Beverley—Carriage wheels.
109. H. Holland, Birmingham—Umbrellas and parasols.
111. H. Corlett, Summer Hill, Dublin—Carriage springs.
113. B. G. Sloper, London—Separating gold from earthy matters.

Dated 18th January, 1854.
115. E. Lord, Todmorden—Looms.
117. C. S. Cahill, Greenwich—Telegraphs.
119. W. Greenshields, Edinburgh—Chenille fabrics.
121. E. Sharpe, Swadlincote Potteries, near Burton on Trent—Sifting clay.
125. J. P. Bourquin, Newman street—Troughs, &c., for photographic purposes.

Dated 19th January, 1854.
129. J. Norton, Cork—Communication between the different parts of railway trains.
131. H. Guyon, Paris—Bread.
132. H. Brownentt, Liverpool—Treating scrap and waste iron.
133. F. Parkes, Sutton Coldfield—Fixing tools in handles.
134. J. Hunt, Massachusetts, U.S.—Sewing machinery. (A communication.)
135. C. W. R. Rickard, 5, Great Charlotte street, Blackfriar's road—Cocks and taps.

Dated 20th January, 1854.
136. H. Dircks, 32, Moorgate street—Safety apparatus for boilers and stills.
137. H. B. Condy, Battersea—Sulphate of soda, &c., and muriatic acid.
138. Lieut. E. Aitchison, R.N., 14, Manor street, Chelsea—Tubes of tubular steam boilers.
139. A. E. L. Bellford, 16, Castle street, Holborn—Cutting cloth, &c. (A communication.)
140. O. R. Chase, Boston, U.S.—Pulverizing machinery.
141. J. I. Field, Charles terrace—guns, cannon, &c.
142. R. A. Smith and A. M'Dougall, Manchester—Deodorizing sewage, &c.
143. J. H. Johnson, 47, Lincoln's inn fields—Stays or corsets. (A communication.)

Dated 21st January, 1854.
144. R. Roberts, Manchester—Cutting paper, &c.
146. M. L. L. Beaudloux, Paris—Candlestick and shade.
148. G. Grace and T. F. Jones, Birmingham—Boots and shoes.
149. J. Westerton, Earl's Court road, Brompton—Night light boxes.
150. C. M. T. du Motay, 24, Rue Fontaine St. George, Paris—Oil from rosin.
151. H. E. Falk, Gateacre House, Liverpool—Salt.
152. T. B. Venables, Burslem—Earthenware.
153. P. Spence, Pendleton—Prussiates of potash and soda.
154. D. Warren, Exmouth—Raising, pumping, or forcing water.
155. C. J. Edwards, Great Sutton street—Bands for driving machinery.

Dated 23rd January, 1854.
156. A. Shanks, 6, Robert street, Adelphi—Punching and sheering metals.
157. C. C. Armstrong and W. Pursall, Birmingham—Percussion cap.
158. W. Darling, Edinburgh—Sewing machines. (A communication.)
160. T. Robinson, 5, Farringdon street—Filtering volatile liquids.
161. M. A. Muir, Glasgow—Weaving.
162. J. Lockhart, jun., Paisley—Bobbins.
163. J. G. Taylor, Glasgow—Treating the fleeces, &c., of animals.
164. J. G. Taylor, Glasgow—Lamps, &c.
165. H. Seebohm, Esholt, near Leeds—Combing wool, &c.
166. J. Getty, Liverpool—Tubular bridges, &c.
167. J. Westlake, Totness—Pulverizing, &c., ores, &c.
168. A. E. L. Bellford, 16, Castle street, Holborn—Bending metal, &c. (A communication.)
169. J. M. J. L. Bouvet, 29, Boulevart St. Martin, Paris—Kneading machines.
171. R. A. Brooman, 166, Fleet street—Sawing stone and marble. (A communication.)
172. R. A. Brooman, 166, Fleet street—Extracting copper from the ore. (A communication.)
173. A. T. Wagner, Berlin—Psychograph, or apparatus for indicating persons' thoughts by the agency of nervous electricity.

Dated 24th January, 1854.
175. G. Williams, 16, Cannon street, St. George in the East—Water closets.
177. J. L. Schlossmacher, Paris—Support of lamps.
178. J. Ridgway, Cauldron place, Stafford—Applying heat, &c., to kilns, &c.
179. W. J. Ellis, Salford—Turntables.
180. W. Massey, Hemer terrace, near Liverpool—Artificial teeth.
181. J. Bapty, Leeds—Preparing wool, &c.
182. S. C. Lister, Manningham—Combing wool, &c.
183. J. Bird, Kingswinford, Dudley—Kilns for burning bricks, &c.

Dated 25th January, 1854.
184. J. A. Mingaud, St. Pons (Hérault)—Ornamental surfaces on velvet, &c.
186. W. E. Newton, 66, Chancery lane—Violins, &c. (A communication.)
188. W. H. Thornthwaite, Newgate street—Sulphuric acid.
190. A. L. Reid, Glasgow—Printing textile fabrics.

Dated 26th January, 1854.
192. T. Wicksteed, Leicester—Sewage manure.
194. T. Wicksteed, Leicester—Sewage manure.
196. C. Reeves, jun., Birmingham, and W. Wells, Sutton Coldfield—Casting metals.
198. S. S. Stallard, York street, Leicester—Knit fabrics.

WEEKLY LIST OF PATENTS SEALED.

Sealed February 2nd, 1854.
1804. William Henry Clarke, 20, Great Marlborough street—Improvements in the manufacture of a composition resembling 'papier maché' and 'carton pierre,' and applicable to the same purposes to which 'papier maché and 'carton pierre' are applied; parts of which invention may also be applied to the construction of ships and boats, and roofing.
1802. William Perks, junior, of Birmingham—New or improved tap for drawing off liquids.

Sealed February 3rd, 1854.
1811. Joseph Clisild Daniell, of Bath—Improvement or improvements in preparing food and litter for cattle, pigs, and other animals.
1821. Charles Hill Snell, of the Triangle, Hackney—Improvements in the manufacture of soap.
1828. Joseph Lallemand, of Besançon—Manufacture of paper from peat.
1831. William Smith and Thomas Phillips, of Snow Hill—Improvement in gas stoves.
1946. Jean Baptiste Polaillon, and François Maillard, both of Lyons—Improvements in the manufacture of starch.
2567. William Foster, of Lister terrace, Bradford—Improvements in looms for weaving.
2649. Peter Alexander Halkett, of the Albany, Lieut. R.N.—Improvements in apparatus for lifting and lowering ships and other heavy bodies, either submerged or otherwise.

Sealed February 6th, 1854.
1841. Richard Bartholomew Martin, of Suffolk street, Haymarket—Improved plate-warmer.
2257. James Leadbetter and William Wright, both of Halifax—Improvements in machinery or apparatus for raising fluid and solid substances.
2302. Alexander Edward Dudley Knox Archer, 1, Wharf road, City road—Improvements in apparatus for applying metallic capsules.
2317. George Fergusson Wilson, of Belmont, Vauxhall—Improvements in the manufacture of candles and night lights.
2483. Thomas Seal Blackwell, of Cranbrook, Kent—Improvements in apparatus for signalizing and stopping railway trains.
2826. James Robertson, of Kentish town—Improvements in the consumption or prevention of smoke.
2860. Arthur James, of Redditch—Improvements in counting, measuring, and weighing needles, and in preparing papers to receive the same.
2863. Charles Mackenzie, of Bayswater, and Alexander Turnbull, of Manchester square—Machinery for paring fruit and vegetables.
2868. John Chisholm, of Holloway—Improvements in the distillation of organic substances, and in obtaining products therefrom.
2896. Frederick Albert Gatty and Emile Kopp, both of Accrington—Improvements in printing and dyeing cotton, wool, silk, and other fibrous substances.
2916. Alexander Cochran, of Kirkton Bleach Works, Renfrew, N.B.—Improvements in the application of starch or other substances of a similar nature to woven fabrics, and in the machinery or apparatus employed therein.

Sealed February 8th, 1854.
1865. David Mushet, of Coleford, Gloucestershire, and Edwin Whele, of Shifnall—Improvements in propelling steam-vessels or other vessels.
1883. Read Holliday, of Huddersfield—Improvements in lamps, and in lanterns used therewith.
1951. Samuel Lomas, of Manchester—Invention of an improved silk cleaner.
2513. John Gray, of Dublin—Invention of a self-acting flushing apparatus, applicable to sanitary purposes.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854.				
Feb. 2	3559	A Spring Hook Spinning Bait	John Cheek	132, Oxford street.
" 3	3560	Ladies' Waistband Clasp	Welsh and Brierley	Halifax.
" 4	3561	Machine for Washing Flyers and other articles	William Oxley and Co.	Manchester.
" 7	3562	A Tooth Brush	Henry Thomas Boden,	Birmingham.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 17, 1854.

ELEVENTH ORDINARY MEETING.

Wednesday, February 15, 1854.

The Eleventh Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 15th instant, Henry Cole, Esq., C.B., in the chair.

The following candidates were balloted for and duly elected:—

Charley, William	Parnell, Michael Leopold
Farley, Thomas	Riddell, Rev. Thomas
Gower, Hon. F. Leveson, M.P.	Roundell, Rev. Henry
Judkins, Charles T.	Tinker, Frederick
Manning, Samuel	Wilkinson, Samuel
Mee, John	AS A CORRESPONDING MEMBER.
Newmarch, George Frederick	Tolhausen, Frederick

The following Institutions have been taken into Union since the last announcement:—

341. Poole, Mechanics' Institute.
342. Tottington, (near Bury, Lancashire,) Mutual Improvement Society.
343. Workop, Reading Society and Mechanics' Institute.

Also 340. Hull, Chamber of Commerce and Shipping; reasons for which will be found at page 236 of the present Number.

The Paper read was

ANCIENT AND MODERN METAL-WORKING AND ORNAMENTATION; WITH SOME ALLUSION TO THE NEWLY DISCOVERED ART OF NATURE-PRINTING.

By W. C. Aitken.

Before proceeding to the consideration of the more immediate purpose of the present paper, and directing your attention to the various specimens displayed before you, to which I will, as occasion requires, point for the more complete elucidation and illustration of the processes alluded to in my paper, may I crave your indulgence for a very brief space of time while I introduce for your consideration a few remarks on the subject of ornament on metal work generally. I am the more anxious to do this in order to place before you in its true light the necessity which exists for gratifying the demand now universally made for articles in and on which ornament is extensively introduced. That this demand has its origin in a desire for the beautiful, admits of but little doubt; that the faculty should be educated to desire what is correct is, I think, now very generally admitted; that it has not hitherto been so, must be laid rather to the charge of those in authority over us than to ourselves. An improved and improving taste is, however, observable; attributable, doubtless, to the increased and increasing circulation of works treating on ornament as applicable to the productions of the national industry, to the slowly but surely expanding, extending, and elevating influences of our schools of design; to the exhibitions of manufacturing art in the provinces; and last, but by no means least, to the great industrial display of 1851, which had its origin under the auspices of the Society within whose theatre I now have the honour to address you.

Admitting, then, the existence of a natural desire for ornament which is to be found alike in a civilised and uncivilised state of society, it follows as a natural consequence that the demands of the former must keep pace with the possession of the means to procure it; and the character of the supply will in turn manifest the capabilities of the producer and his appreciation of the taste of his customers. Experience tells us, however, that, low as some may be disposed to consider the public taste, it indicates a growing feeling and tendency in the right direction. Those who have watched the avidity with which articles of an improved character have been laid hold of and purchased, will have no difficulty in detecting the change for the better which has come over even the spirit of common things. The gaily-painted plaster cast has given place to another, in which elegance of form is more apparent; the crudely formed and vulgarly coloured mantle-shelf ornament has in turn been superseded by the delicate and beautiful Parian statuette. We have now but few China services, so glaringly vulgar in their decorations, as of old; coarsely executed woodcuts, gaudily coloured, are but seldom now to be seen hung on the walls of the dwellings of the humbler classes. The japanned tea tray wears a more sober livery; the room paper which ten years ago would have been looked upon as a marvel, would now be repudiated entirely; almost every article for household use, into which the element of ornament is introduced, demonstrates an improved and improving taste;—it ought, therefore, to be our duty to consider how this requirement may be made subservient to the cultivation and elevation of the public taste, by the substitution of superior ornament to that now in use; and this may be done to a great extent through the medium of mechanical reproduction with a larger infusion of the artist into the design to be reproduced than has hitherto been the case. That such is not quite an impossibility I trust to make apparent to you before the conclusion of this paper.

If in this direction much more has been attempted than has been accomplished, it is only an evidence to my mind that those who have attempted to do so have failed because the processes they employed were determined and limited in their applications and capabilities; and that they had selected examples or designs for imitation which the human hand, with its varied and multiform movements, aided by the intelligence of the human mind, could alone accomplish. In reference to this department of the subject it may be suggested that it might be better to dispense with ornament altogether, or apply only that which is of an exceedingly high class, and adapted to the various objects which find their way into the houses of the titled and wealthy. Admiring the labours of the artist-workman of the fourteenth, fifteenth, and sixteenth centuries, admitting the beauty of their handicraft, I well know that such ornament as they introduced, and which it is contended by many is the only legitimate kind, could only be produced by art-workmen like themselves, and therefore at a cost which would entirely exclude ornament altogether from what is used by the middle and operative classes, thereby effectually putting a stop to the expansion of the ideal faculty, and inducing a puritanical and non-artistic quakerism which could not fail, if adopted, to retard our progress in matters of taste.

It has become fashionable to decry certain kinds of ornamentation in which mechanism has taken the part of hand labour. The origin of this may, I think be traced to the ever-to-be-lamented Pugin, who has been closely followed, like every other great man, by a train of disciples, the majority of whom, it is just possible, would scarce have detected for themselves what he has pointed out and made apparent. An examination of the treasures of art-workmanship to be found in continental collections of antiquities—chiefly, however, in the first instance of a sacred kind and for sacred purposes—disclosed to him the peculiarities which distinguished early and middle age workmanship, and demonstrated to his mind certain principles in ornament and in construction which have since become deservedly canons, which canons have, however, been applied somewhat indiscriminately by his followers.

In doing so they seem to have forgotten or altogether overlooked the premises upon which his conclusions were founded, and that they have no parallel in England in the present day. In the middle ages, what was decorated? Only the cathedrals, churches, the palaces of kings and princes, the halls of the guilds, and the dwellings of the wealthy merchants. In the possessors of these, lay, or was concentrated, all the patronage and wealth of the various countries and states. They patronized Art in order to add to their magnificence and grandeur; to gain an additional prestige, and another claim to the admiration of the multitude. This rather than a desire to patronise art, for its own sake, to rival the glories of the ancient races, whose magnificence in matters pertaining to art, history and tradition had handed down to them, the desire to emulate such magnificence was doubtless the leading and moving principle which animated them. The few attempted to do, in the middle ages, that which the many did in Ancient Greece; there the most expensive material upon which to work, the greatest of artists then to be found to do the work, would alone satisfy the cravings of that naturally-constituted art-appreciating people, the whole of whom were animated with the like passion for art which distinguished their great leader, Pericles. We are told, as an illustration of this, that when the sculptor, Phidias, recommended marble as a cheaper material than ivory, for the great statue of Minerva, about to be erected in Athens, it was for the reason that it was more costly, that ivory was preferred by the unanimous voice of the assembly. In Greece, as in Italy, France, and Germany, at a later period, the passion for art doubtless served an excellent purpose; for in discussing the merits of the last newly-erected building, inaugurated statue, or coming spectacle, the people forgot their feuds and woes, personal or political, and the tyranny of their rulers, lay or clerical. On the authority of Bulwer, we learn that with the extraordinary development of art in Athens, the dwellings of the people were not in keeping—the houses of her private citizens were simple and unadorned—the streets were narrow and irregular, and even centuries afterwards a stranger entering the city could not have recognised her claims as the mistress of Grecian art. This statement is peculiar, but it is important as showing that while the patricians enjoyed within their dwellings and private grounds all the gratifications arising from objects conceived and executed under the operation of the ideal faculties; while for them Apelles, it may be, painted a Venus, and Praxiteles chizelled a marvellous statue; while some gold or silver smith, or carver in ivory, famed for his cunning workmanship, elaborated some costly jewel, or cup, priceless beyond the value of the material in the yet higher value conferred on it by its art workmanship; while some Samian potter, celebrated for the exquisite taste displayed in the very simplicity of the contour of his vases, evolved from his wheel some masterpiece of his art; while all this and much more was being done for the few, we hear of nothing being done for the many. The same, undoubtedly, holds good at a later period, when Rome and Florence luxuriated in the hey-day of their prosperity, and art reigned supreme. It was to the few still that art more particularly spoke. No doubt can exist but that the people derived much pleasure and gratification from the magnificent buildings and other works of art with which their cities abounded. We know, however, that so far as domestic comforts were concerned, the poorer classes were very deficient—their means were small. If comfort then was in abeyance, much of an ornamental kind could not be expected to be found in their dwellings. Ornament belonged only to the wealthy; it could only be had by being paid for at an expensive rate. Hand labour is in all civilized countries costly; at least such labour as in connection with intellect and the perceptive faculties gives existence to works of art, or the higher class of art manufactures. The people were content with what they saw publicly exhibited; they imagined it was their own, and in this idea they were gratified. Not so with England and Englishmen, existing under a government which is freedom itself, with an equalization of wealth among the various classes to which the most prosperous nations of antiquity were strangers; with the great majority of the people in possession of comparative comfort, the desire for something more, naturally manifests itself among them. It is unnecessary, in the presence of an audience like the one now addressed, to explain the great cost consequent upon high class artistic workmanship being employed; and the still greater difficulty which, under present circumcumstances, there would be, were the demand for hand ornamented work general, arising from the difficulty there is in finding workmen in sufficient numbers and in possession of a sufficient amount of average artistic manipulative skill. It is not with us as in those countries from whence were imported the works in precious stones, metals, ivory, and embroidery in costly materials, which so deservedly attracted so much attention in the great Industrial Exhibition. The value of labour in these, as contrasted with that important element in England, will not bear comparison. In those countries a vast population exists without any adequate means of employment. There is but little to be done, and there is consequently an excess of the means of doing it. Labour is therefore cheap, and it makes but little matter how much is expended; such labour in turn becomes simply a kind of luxurious idleness. With us it is different; we live in a country of improvement and progression: what is our goal to-day will in all likelihood be our starting place to-morrow. Did we content ourselves, as was the case in time past, with making, it might be all very well, but we have arrived at a higher point in the social scale.

We now manufacture, and we manufacture for the world; and, with all the defects in our manufactures, the world is glad to get them, and in this it will take no denial. Our exports increase, though we may hear an occasional growl or two here and there from an art critic, or some one who lived in the days when a common and crude thing costs double the money it does now; while some *parvenu* turns up his nose at a pretty thing, rejects it because it is common, and because he says everybody has it, forgetting that "a thing of beauty is a joy for ever," and that in nature such things as are beautiful are most lavishly provided for the gratification of man. There is another class who content themselves with finding fault without the power to mend; they abuse manufacturers without being aware of the difficulties against which that important class have to contend; and they point to the time when workmen are said to have done things for the pure love of doing them; when locksmiths delighted to exercise the utmost resources of their art on the locks they made, forgetting that now a days it is not the external ornamentation but the internal workmanship which is the more important consideration; that we make locks which cannot be picked except by Hobbs, and, more than that, that they are made in ship loads, and that the locks made in England alone serve to lock two-thirds of the doors that are locked in the world. With every desire to believe the best things of the middle-age workmen, I am quite of opinion that much of what they did, and how they did it, was the result of ignorance and want of knowledge, arising out of the imperfect state of science in its application to industry. I cannot account for the round-about way in which they went about certain things upon any other principle; we may depend upon this, that had they been acquainted with many of the processes now in use, they would gladly have availed themselves of them. I do not believe that everything they did arose from their desire to do the work for the work's sake. In doing so, I think the admirers of mediævalism have attributed to a higher sentiment that which had its origin in a lower; and I think they have not failed to detect much in the labours of the men they admire, which the men themselves never anticipated or intended. Doubtless there were enthusiasts among them as there are

among ourselves: but to assume for them a superior amount of sincerity, truth, and sacrifice over ourselves, is what I respectfully submit may, with perfect justice, be questioned. When two methods exist by which the same result can be accomplished, but the one is much more economical of time than the other, we are bound by the most solemn consideration to avail ourselves of it. To select the more tedious of the two is simply to practice and encourage industrious idleness. Art is assuredly very long, and life very short; if means can then be devised to copy, either by chemical or mechanical processes, and if the copy or re-production comes at all near the original, is it not better to employ such means to re-produce, than expend precious life in imitating only? The life of a great artist workman increases in value as his works are reproduced, his fame is extended, and he largely adds to the amount of human happiness.

How very limited our knowledge of the genius and ability of Cellini must have remained but for the copies of his works, which the discovery of electro-metallurgy has enabled us to produce and disseminate. How imperfect an idea of the celebrated cup of the great Florentine artist the best plaster cast ever gave us, and how perfect in every minute detail is it rendered by the troughs of Elkington. What should we have known of the exquisite busts, statuettes, lamps, tripods, drinking cups, and vases, with the cunning workmanship thereon, or how far did our knowledge of these extend, notwithstanding their existence in the Naples museum, and of which but for the discovery of the art of the electrotype by Spencer, many of us must have remained ignorant. These are the results of a process enabling us to secure at greatly diminished cost, copies from works whose value is priceless, and all but inaccessible to the great bulk of the people; depend upon it those who value things only as they are rare (and there is reason to fear there are many of this class to be found), behave unjustly to their fellow-men in opposing such means to an end so important. They nip in the bud the expanding and growing taste of the people. Are we then to reject every thing of an ornamental kind which is not hand-made? Are we called upon to refuse the assistance which the group of appliances which follows will afford us? Thus Cheverton's process reduces the full size statue to a mere statuette with an ease and certainty which the unaided eye and hand could never accomplish; or Collas's ingenious process, which produced upon paper the magnificent series of French medals known as the Napoleon series; or that of Bates, an Englishman and a Londoner, who invented the patent anaglyphtograph, improved upon the machine used by Collas, and produced thereby specimens of far greater excellence, and size. Need I instance, as an illustration among others, the copies of basso-relievos issued by the Art Union of London. Jordan's wood-carving machine with a little hand labour, adding the grace touches, produces results which, though certainly not equal to the works of Gibbon, are not bad substitutes in their stead, and may be accepted cordially where economy is a requisite, or where limited means accompanies a taste for ornament. Where uniformity of pattern or ornament is desired, this style of work may even be preferable to that produced by hand labour. In perforated woodwork, whatever may be the charm of hand labour, it cannot certainly surpass the mechanical saw-piercing of Prosser and Hadley. The mechanically formed tiles of Herbert Minton are, in durability and in beauty, equal to any encaustic tile fragment, dug up from among the ruins of any Cathedral chancel, while they fit together much better, and are cheaper. The cylinder printed room-papers of to-day all but rival, where simplicity, design, and uniformity of pattern prevails, the best hand-printed specimens. The tapestry of Crace, in tone, colour, and excellence, was never equalled or surpassed by any fabric produced in a loom of the most primitive construction, or even hand made. My conviction is, that had the middle age weavers been in possession of the Jacquard loom, they certainly would not have rejected its assistance.

I do not desire to decry the labours of the really earnest men of old, who produced much of what is worthy of admiration and imitation, but I think they and their doings have been over-estimated, while our own have been correspondingly undervalued. There is probably nothing more amusing than the contradictions which the advocates of mediæval principles display and countenance in their practice as opposed to their theory, and in their adoption of certain most unconstitutional exceptions and practices. An apostle, who out-Herod's Herod in literary devotion to the cause, expresses himself as follows:—"One thing we have in our power, the doing without machine ornament and cast iron work, all stamped metals and artificial stones, and imitation woods and bronzes, over the invention of which we hear daily exultation—all the short, and cheap, and easy ways of doing that whose difficulty is its honour, are just so many ways or new obstacles in our already encumbered road." Will it be believed that with all the detestation of die work and mechanical repetition, the volume in which the above eloquent diatribe is contained is ornamented by one of the processes so bitterly condemned by the writer, viz., die work.

To make my meaning clearly understood, while I express myself thus on hand ornamentation, I do so with the most earnest desire that where there are occasions and opportunities for those possessed alike of station, wealth, and taste to employ the highest class of talent, they will not fail to do so, and that those who may be employed will not fail in their turn to desire to emulate the glories of the ancient art-workman; let us hope that that art, that true art, which transmutes everything it touches into a thing of almost priceless value, may be appreciated as it ought; that in time to come the value of an object produced from the precious metals will cease to be estimated only according to the weight of the material employed therein; that the head which plans, and the hand which executes, may be found united together: and that the remark which has been so judiciously applied by the Art Superintendent, in his report upon design, and in reference to works of precious metal exhibited in the French Department of the Exhibition, may be equally said a few years hence of the works in precious metals produced in this country, viz., "that we have regarded the material, rich and costly as it is, merely as the vehicle of the art added to it." On the other hand we must recollect that there are amongst us great numbers of the people, who, with a desire for ornament, are not in a position to expend great sums of money thereon, so far as regards the decoration of their dwellings, or on what may not improperly be called their household gods. In ornament in things produced by man for man's use, the same liberality which is so bounteously recognisable throughout creation should be observed. Rare plants which grow in hothouses and under glass cases of right belong to those of high estate, but for those of low degree blooms every hedge-row flower; the daisy lifts its purple eye to heaven, and the buttercup gilds the mead: they indicate that in the mental constitution of man there exists a feeling taking cognisance of the beautiful to be gratified. Articles in which ornament is introduced should therefore be provided for every rank and condition of man who may desire them. Permit me now, therefore, to direct your attention to a few of the processes by which the end desired may be accomplished. In doing so I will in some instances contrast the ancient and modern methods of working metal, and, so far as my time will permit, point out their distinguishing peculiarities and characteristics.

The processes employed by the earlier workers in meta must necessarily have been of a very simple kind, and in all probability, like many of the great discoveries made by man, casting itself was simply the result of accident. Tradition tells us that the discovery of the art of glass-making had its origin in a band of Phœnician mariners,

who kindled a fire on the banks of the River Belus, and being unable to find stones on which to set their pots, used instead some masses of nitrum: these being fused by heat and uniting with the sand of the sea-shore, produced glass. Is it not in like manner exceedingly probable that the art of casting had its origin in an accidental observation that melted metal, in cooling, took the form of the irregularities of the surface on which it had run. Whether this was the earliest method adopted for copying, or producing works in metal, it is difficult to determine. The sacred volume, at a period of 4,000 years before the Christian era, tells us of the existence of Tubal Cain, an instructor of every artifice in brass and iron. It is, however, silent as to the processes employed by him. At a somewhat later period, B.C. 1491, the distinction between two methods of working metals is very clearly made out. Thus, the artificer who was employed in the formation of the metal-work for the Tabernacle in the Wilderness, according to the command of Moses, is stated as having among other portions "Cast the four rings of gold, to be attached to the four corners of the Ark," by which it might be carried or borne aloft, while he made the golden candlesticks of beaten-work. No doubt can exist but that the idol which the Israelites desired Aaron to make, was cast; and it is singular to remark with what minuteness the process of making it is described. He is represented as having fashioned it with a graving tool; after he had made it a molten calf, or cast it, he in fact pursued the same course as is still followed. After casting he chased or worked upon it with a graver, to render the details more perfect. In the metal work for the Temple, built B.C. 1000, the process of casting seems to have been that which was adopted by Hiram of Tyre, the artificer employed by Solomon to do the works in brass bronze. It may be remarked that though the words *molten* and *cast* are frequently used in the description, that of *beaten* does not appear when brass is mentioned. The pillars are said to have been cast, and also their capitals. The knobs which encircled the molten sea were *cast* in two rows, the bases on which it rested and the wheels upon which it moved were all cast. Additional evidence may be adduced as to the method adopted in casting, in so far as the materials used to cast in were similar to our own, for we are told, "In the plain of Jordan did the King cast them, in the clay land between Succooth and Zarthan." The Egyptians were acquainted with the art of casting, the Assyrians were equally so, as the discoveries of Layard prove. The Greeks had arrived at a considerable degree of perfection in the art, and tradition tells us of a Colossus, of dimensions so vast that it bestrode the entrance to the Harbour of Rhodes; it was made of brass bronze; its height numbered nearly 160 feet; the thumb was so large that few men could span it, and it took 12 years to make. There is not a more interesting history in existence than that which tells us of the productions of the great Italian artists in the art of bronze casting; the doubts and difficulties which they laboured under, while the work was in progress, expressed by themselves in quaint and curious language, and the enthusiastic expressions with which they heralded their own success, and announced the existence of a new statue or group into the world of Art. Who that has ever read the biography of that eccentric genius Benvenuto Cellini, but must enter into the mingled feelings with which his mind was agitated on the results of a scheme which was to stamp his future life, and, if successful, throw confusion on his imagined enemies and detractors. I here allude to his description of the casting of his group of Perseus and Andromeda, abounding as it does with clever practical hints. To those interested in Metal Castings, let me recommend that particular passage to their careful perusal. The life of Ghiberti should also be studied, as it abounds in practical details, and is a noble illustration of devotion to art; the history of the celebrated Bronze Gates of the Baptistry at Florence, wrought with so much care, so marvellous in execution, so excellent in design, uniting together in one harmonious whole, contributions from all the department of nature, representing the most momentous events recorded in Bible History, and in a language equally understood by the most highly educated, or by the unlettered lazy Italian beggar, who suns himself outside, so noble are these doors, that the greatest spirit who ever ruled in the realms of Art is recorded to have said, "they are so beautiful that they might fittingly stand as the gates of Paradise." A great modern but somewhat inconsistent Art critic, has expressed himself in reference to them as follows:—The rock, the fountain, the flowing river, with its pebble bed, the sea, the clouds of heaven, the herb of the field, the fruit tree bearing fruit, the creeping thing, the bird, the beast, the man and the angel, mingle their fair forms on the bronze of Ghiberti. Forty years were expended on these doors, forty years however which purchased an immortality, and supplied examples to which the most accomplished artist and the veriest tyro in art may repair to examine and receive instructions in composition, in the treatment of ornament, in mechanical execution, and other details, essentially necessary to be understood, in order to produce works for similar purposes. We pass over without allusion the works of Donatello, Verrocchio, John of Bologna, and of Michael Angelo, and remark that of late years, a decided and recognised impulse has been given to the art of bronze casting. The Exhibition of 1851 showed that we are not wholly without the power of producing castings in bronze, which are something more than creditable; and when speaking of what has been done by ourselves, let us not forget the collossal Lion of Bavaria, cast in bronze by Millar, just as it left the mould wherein it was cast; and though *not* as a bronze casting, yet *as a* casting, the Amazon of Kiss must not be overlooked; all these are so many evidences that the art of bronze casting is not lost, neither is it likely to be.

Of the method applied for the production of a bronze statue, we may now give a brief sketch. The model being decided upon, a pit is dug of sufficient depth, and a grating fixed at some distance from the bottom; upon this is raised a rude representation of the intended figure or group, proportionably less in size, and corresponding to the hollow of the interior; this is technically called a core; after this is sufficiently dried, sheets of modelling wax, corresponding to the thickness which the metal is intended to be, is spread upon it; on this the features, drapery and other details to be represented, are reproduced by the artist with his modelling tools. Rods of bronze or of the same kind of metal of which the statue is to be cast, are driven through the wax, and project sufficiently to pass into the outer cover of the mould. These fuse with the molten metal, and are therefore not recognized in the finished statue. From the prominent parts rods of wax are projected, which rise upwards and are intended to allow the escape of air, the presence of which is attended with danger to the workmen, and is liable to endanger the perfection of the casting. Other rods of wax indicate the passages through which the metal is to be run. The external surface of the wax model is now coated with loam or powdered crucible, ground with water to the consistency of cream, and applied by a brush all over the wax; coat follows coat until it is ascertained that a sufficient thickness is arrived at, after which clay is heaped upon this, and the whole cased with bricks, bound together by means of iron rods; heat is then applied under the grate; the wax which represents the thickness of the metal, melts and runs out; the heat which served to melt the wax, answers the purpose also of drying the mould, and expelling the damp; when covered up the top of the mould is below the level of the furnace which contains the melted metal, and which when at such a temperature as to secure complete fluidity, is tapped or opened, and the liquid metal then runs through the various channels until the mould is filled. After being allowed to cool a sufficient time, the

outer coating of the mould is destroyed, and the statue stands revealed. The runners are then cut off, the core removed, and the whole is chased or finished as may be desired. In some instances, portions are cast separately, and joined together by burning. This process consists in allowing a stream of melted metal to operate upon the parts to be joined together, until fusion of the two takes place, when they will be found completely united.

For small castings in metal, such as statuettes or works of an ornamental character, sand is usually employed to cast in. As this material has the advantage of allowing an escape of air, and its cohesive properties are so great as to admit of considerable liberties being taken with it during the process of moulding, it is generally preferred. Simple cylindrical articles are easily moulded; and it is only when there are figures, foilage, and deep under-cuttings introduced, that the operation is attended with difficulty. This difficulty consists in judging as to the number of cores to be employed. These the workman makes upon the pattern, removing them for the purpose of lifting the pattern out; the small pieces of sand or cores are then replaced, the mould dried, closed, and held together, in order to receive the melted metal. When very great delicacy of surface or texture is desired, the ordinary sand has its capacity improved for receiving the impression by dusting upon it a very fine loam, and thereafter powdered or ground wood charcoal, the consequence of which is that the most delicate line, mat, or chase, is imparted to the sand matrix, and is in turn communicated to the casting. Patterns for ordinary plain work, either round or square, are made in the turning lathe, or by planes and chisels. Ornamental patterns of figures or foliage are in general first modelled in wax, from which a cast in lead or tin is taken; this cast is trimmed up neatly, and from it a cast is taken in brass, which is carefully smoothed up and chased. This then becomes the permanent pattern from which any number may be cast. Care and attention in this department is of the utmost importance in the economy of time, and to the ultimate perfection of the work.

I have already incidentally alluded to the fact of works in metal being produced by the beaten process, a method of working, in all probability, adopted immediately upon the malleable and ductile properties of metals being recognised. Gold and silver appear to have been first treated in this manner, the ductility and malleability of each being very great. The frequent allusion made to overlaying with gold in the Sacred Volume, indicates that some means had been found out at a very early period, in addition to casting, by which these metals could be wrought into suitable form for the purpose, viz., rendered sufficiently thin; and we receive the additional information as to this, from the minutely detailed instructions given as to how the candlesticks for the tabernacles should be made, viz., of beaten work of pure gold. The Assyrians understood the process of hammering. Among the relics dug up at Nineveh was found a bronze mask, beaten out by a hammer, and various other portions of articles. The Greeks covered large statues with plates of gold, probably reduced by hammering. At a later period the art was revived by different Italian artists, whose labours are now to be seen in the various Continental museums and collections. The advantages resulting from the beating, embossing, or *repousse* method of working metals is, the great amount of effect produced, in comparison to the value of the material used—the art bestowed upon the metal creating the value, and not the metal itself. Of this class of workmanship were several of the vases made for Francis the First by Cellini: some of these, two feet in height, were raised from a single flat disc of metal; careful hammering, annealing, and a judicious selection of tools, could alone have accomplished such a result. Recently the Art has been revived with singular success by the French, and those who felt at all interested in the progress of Art manufacture could not have failed to remark the truly magnificent shield by Vechte, exhibited by Hunt and Roskell, dedicated to the illustration of the genius of Shakespeare, Milton, and Newton. A work equally extraordinary was that of the Vase, Etruscan in form, on which, in the most delicate and also with the boldest relief, was introduced the Battle of the Titans; this Vase was also raised from thin sheets of metal. Another shield, with the Slaughter of the Innocents as the subject, and produced by the same process, was exhibited by Le Page, in the French Department of the Exhibition. Morel, however, exhibited by far the most extensive application of the process, in his Equestrian Group of Queen Elizabeth, the height of which was four feet two inches, and the length three feet. It was entirely formed of plates, beaten out by the hammer, which when fitted together were thereafter held in their place by soldering. We may briefly glance at this process, which, in its simplest form, may be described as follows: a proper sheet or disc of metal having been selected, the artist sketches his design on the reverse side to that which is intended to be the finished work; he proceeds to raise the various projections by a series of punches, &c. When he has obtained the necessary convexities, which he thinks will give sufficient relief to the subject and will look well, he fills the back of the work up with a mixture of pitch, rosin, and sand, and attaches it to his chasing block, or ball; he then works on the convex or right side with his chasing tools, with these adding the details of features, drapery, and foliage; any roughness is removed by means of rifflers, the work is then polished and thereafter burnished, gilt or parcel gilt. In this class of art the Italian gold and silversmiths of the 15th and 16th centuries were adepts. The art was revived in France in 1838, and has ever since been practised with success. In our own country, Pugin, in his efforts to revive and improve the character, taste, and style of Ecclesiastical metal work, introduced anew the art of beating up, and by this process Messrs. Hardmans produced many of their most brilliant and successful works. In connexion with this part of my subject I may remark, as to the difficulties which the late A. W. Pugin had to encounter, in his self-imposed task of Church restoration; among others was that of finding workmen sufficiently aquainted with the old methods of manipulation. He says: "the whole restoration has been a series of experiments; everything had to be created from the employer to the artizan; such was the difficulty of procuring operatives that I was compelled, for the first altar lamp I ever produced to employ an old German, who made jelly moulds for pastrycooks, as the only person who understood beating up copper to the old forms."

Opposed, then, to the somewhat tedious and very expensive production of works in metal, by casting or hammering, we come to the modern art of electro-metallurgy, or the deposit system, which admits alike of the creation of new, and the reproduction of old works of art, at a cost which enables men of comparatively limited means to gratify their taste. Thus we find, in the Department of Practical Art, a magnificent rosewater dish, for a sideboard, the original cost of which, if made by hand, could not possibly be less than £100, but which may be had for £6 6s. Also a more elaborate work, of the Rennaissance period, with bas-reliefs of the Prodigal Son introduced thereon, the original cost of which could not certainly be less than £200, but which may be had for £12 12s. The most elaborate details may be copied by this process with the most minute accuracy, while the largest work for which a tank could be made to hold a solution and a battery, of power sufficient to generate a supply of the electric fluid would not be beyond the limits of the art. Were it necessary, another Colossus of Rhodes could be produced by its agency. The truly excellent specimens of statuary which now occupy their place in the House of Lords, sufficiently demonstrate its fitness for producing statues or groups for monumental or commemorative purposes. In the formation of a statue by the deposit process, there is not that hurry and skurry—that mental anxiety—which occasions such sad havoc in the human

brain and mind. The mould, produced from a carefully executed model, is rendered conducting, and then immersed in a solution of copper. The deposition of the metal goes on while we sleep, provided the fluid is generated in sufficient quantity, and the strength of the solution is kept up. There is no anxiety as to the congealment of metal consequent on the inattention of firemen, nor the chance of bursting a furnace from the expansion of the melted metal, or the thousand-and-one accidents which perplex the caster in bronze, but, it may be, adds to his delight when the statue stands revealed. Mr. Potts, of Birmingham, has recently applied the art to the production of emblematic groups or relievo panels to be used for sepulchral or monumental purposes; these he places upon various coloured slabs of artificial stone or marble, &c. The result is, as will be readily anticipated, a vast improvement for the better over the memorials of the skull and cross-bones school, which are not even tolerable with the addition of an hour-glass or two, a sickle, a scythe, and half a dozen bodiless cherubs into the bargain. A word or two as to the rationale of the process will not be out of place.

Electro-metallurgy may be described as a process in which a metal held in solution is deposited in a metallic form upon some metal to be coated, or form to be copied. In the last, the cast or mould has to be rendered conducting by being coated with a metallic substance, for which the metal held in solution has an affinity. Black-lead is the substance most commonly used, but nitrate of silver is employed for the purpose when more delicate or fragile moulds are used. The electricity was generated in the early period of the art by means of a galvanic battery in various forms. The loss of zinc and other metals was, however, great, and it was finally superseded (though at times still used) by the electro magnetic machine. This is a comparatively economical method of generating the fluid, requiring little more cost in working, save the repairs of the machine, and the cost of the engine which sets it in motion. It was at one time held that composite metals could not be deposited; brass, has, however, been successfully thrown down, but the cost far exceeds any advantage gained by the deposit. Gutta percha, sealing and other waxes, stearine, plaster of Paris, &c., have been employed in the composition of moulds for internal deposits, but a recent discovery has been made of an elastic mould, which may be fearlessly left in the deposit trough without injury, and which produces the most exquisite details and the most complicated undercuttings. The mould may be removed without injury, and used repeatedly. It had been previously customary to deposit copper on a prepared mould, thereafter to destroy the plaster, and deposit a precious metal (gold or silver) therein; and to remove the copper matrix by disintegration from its more precious internal lining,—when the object desired was exposed, accurately copied even in its minute details. Large works are frequently deposited in pieces, and thereafter fitted and held together by soldering.

Somewhat akin to the beaten work of the ancients and mediævalists is the production of articles, or portions thereof, by the comparatively modern process of stamping, at least in so far as the material out of which the articles are made is in sheets; by the modern process, however, the falling blow of the stamp-hammer takes the place of the hammer of the workman. The requisites for the successful prosecution of the process are a stamp formed of a heavy piece of iron, into which the force is fastened, traversing or sliding up and down two upright bars or rods. The hammer is raised by having a cord attached to it passed over a pulley. The die is held in its place at the bottom of the stamp by four screws or poppets. The die is sometimes made of cast iron or steel. Steel laid upon iron is, however, the most serviceable, and therefore more generally selected. The die is cut from a model which has been previously made by the artist. The die-sinker has to cut in intaglio what is in relievo in the model, that is to say, he sinks into the steel what is in relief in the model; this is done by means of chisels of various shapes and sizes: gravers and rifflers, or small files are used to put the finish upon it; it is thereafter smoothed up by abrasion, or grinding with suitably-shaped hones, or pieces of wood of various forms with emery powder upon them. One of the conditions to be observed by the modeller or die-sinker for stamped work is to avoid entirely everything like under-cutting, as the very nature of the operation of stamping is opposed to it; when introduced the metal will not leave the die. It is very probable that the artist may feel disappointed at the difference between his model, if he has introduced under-cutting, and the work produced from the die; what he has to do is to select a style of ornament in low relief which accords with this mode of production, and model accordingly. As stamping is generally looked upon as a very simple process, it may not be out of place to glance at the "modus operandi," in order to remove an impression which very generally prevails, that it is of so simple a character as to involve in the exercise no skill whatever. The production of a stamped article is not the result of one, but a succession of blows, and the amount of force should be regularly proportioned to the cohesive power of the metal. If too great a degree of convexity is desired to be produced at one blow the metal is fractured or torn; if less than necessary the number of blows is unnecessarily increased; it is in the true proportioning of these that the skill of the workman is shown. The operation proceeds as follows:—To the falling hammer what is called a "force" is attached; the die is placed on the bed of the stamp, and held there by four screws; a piece of flat sheet metal is then laid on the die, the hammer is elevated by pulling the cord, and when at the proper height it is allowed to fall; the result is that the convexity is given to the flat metal by the blow from behind. This, in the first instance, produces a very slight effect, the metal being but little raised; this is carried through a large number of pieces of metal, corresponding to the quantity of articles required; the force is then changed, that is to say, one of greater convexity is substituted, the previously stamped pieces of metal are annealed, and, after cooling, are subjected to the routine observed on the first operation. "Force" after "force" is substituted, each differing from the preceding one in the amount of convexity; annealing follows annealing in succession, until all the details marked on the surface of the die are observable. In the production of the object now before me as many as fifteen blows have been given, consequently fifteen different forces have been used, and fifteen times has the metal been annealed. In some instances I have known as many as thirty blows required, and an equal number of forces and annealings would be necessary to produce a single article. It is in the number sold that the repayment for dies is to be expected, as their cost is very great. Articles of a globular kind are made in parts, and are either soldered or checked together. Cornices are stamped in pieces, and joined by pinning on to the wood skeleton, or they are produced in lengths by what are technically called travelling dies, viz:—dies which are formed as repeats of patterns, and the article stamped is removed, after the blow, the distance between the ornament forward, and so on until the entire length of the strip is finished.

Ornamentation by means of engraving, even of average ordinary quantity, is an expensive process, comparatively speaking, and there are difficulties frequently presenting themselves in the deficiency of engravers to be found to do the work. To obviate these objections and remove these difficulties, various methods have been devised; among others, those of engine-turning and damasking. The sphere of operation of these two processes is, however, very limited. Engine-turning is generally understood to be produced by a lathe, describing a succession of concentric or intertwined circles or lines. The backs and dials of watches are frequently ornamented by this method, and will afford you an excellent illustration of the effect of the process. Damasking, not damascening,

(a process to which the present has no similarity,) is now very generally applied to the ornamenting of small metal boxes, to contain supplies of those now almost indispensable little requisites, lucifer matches. This style of ornamentation is somewhat similar in its operation to the medallion engraving of Bates, which I have already incidentally alluded to. The pattern to be copied is cut round a cylinder, which is fixed in the same plane and parallel with the tube to be ornamented. A point traverses the pattern, and another in connection with it, and which moves simultaneously, cuts a line corresponding to the depressed portion of the design, leaving the raised portion of the pattern blank. The cutting point is drawn the entire length of the object to be ornamented, but only really cuts on what has been described as the raised portion of the pattern. This being completed, the tube is moved a small space, by a mechanical arrangement in connection with the machine, and the line again scratched or cut out, and so on until the entire circumference is ornamented. The colour of the original ground arises from the varnish lacquer or bronze applied previous to the operation of ornamenting being commenced.

Another simple style of ornamentation, devised for ornamenting the tubes of pencil cases and other small cylindrical articles, is here shown, and is produced by a series of small wheels, round the circumference of which the pattern to be indented is cut. The operation is very simple, and the pattern is produced by drawing the reeded octagon or other shaped tube through the space left in the centre of, and in contact with, the rollers and wheels. These revolve, and the tube receives the impression from the cut pattern. A device on their external diameter, another variety of style, is produced by giving to a round tube a spiral motion; the consequence is, that the pattern is arranged running spirally up the tube. This kind of ornamenting is, however, exceedingly limited in its application.

Where large flat surfaces and plain mouldings are introduced in the plated trade, or that of the silversmith, for surface ornamentation, engraving is commonly called into requisition, and not unfrequently a cheaper substitute is that of chasing, which is much more quickly done, and consequently costs less. As engraving or chasing forms a very important item in the cost of an article, various means have been devised from time to time to take its place—among others, that of etching. The objection to this method, however, is the undeniable want of finish in the lines or surfaces operated upon by the acid, and their presenting a rough appearance as a necessary condition contingent upon the effect of the acid. The process is practised as follows:—From engraved plates or other surfaces, impressions on tissue paper are taken in varnish ink; the surface of the metal to be ornamented is cleansed so as to be quite free from grease; and the tissue paper with the design is then transferred to the surface of the metal, in the same manner as is employed in the pottery trade when a design is put upon the ware in its biscuit state. The impression is thus transferred to the metal, the tissue paper being removed by washing it off; a coating of gum is next applied to protect the surface which it is not desired to etch; a little turpentine applied to the transfer dissolves the varnish ink of the impression, and leaves the lines exposed to the action of the acid to which the article is to be subjected. This being done, a copy of the original design will be found bitten in on the surface of the object which it is desired to ornament, the coating or protecting ground is thereafter removed, and the article finished by the ordinary method. When the lines of a design are desired to be left in relief, this is done by simply reversing the process, viz., protecting the impression by dusting it over with powdered resin or asphalte, and subjecting the article on which the transfer has been made to a degree of heat sufficient to produce fusion of the particles of the resin: etching then follows, and the portion previously sunk will be found in relief on a dead ground.

Permit me now to direct your attention to a process which has recently been introduced, with what success the specimens displayed before you will enable you to judge. The merit and chief recommendation of the invention is its very great simplicity, the ease, speed, and facility with which the effect of a reticulated surface, an elaborated, chased, or an elegant scroll or floriated design, apparently engraved, may be introduced on any object. The fact of a soft material imprinting upon a harder one an impress of its form has long been understood; its practical application to the production of ornamental designs upon metal is, however, but of very recent origin. Ornamentation has been produced by rolls upon which the designs have been cut in relief, or the reverse, as those on copper calico cylindrical printing rollers. The cost of sinking such rolls in steel is necessarily very expensive; as a new one would be needed for every change of ornament, their accumulation would become a very heavy drawback on the capital of the manufacturer. By the present process the cost is much diminished, leaving ample room for the introduction from time to time of new and superior designs to meet the taste or requirements of the market. The practical application of the process is due to Mr. R. T. Sturges, of Birmingham, who, in connection with Mr. R. W. Winfield, of Birmingham, is a proprietor of the patent. The origin of the invention may be traced to the competitive spirit of trade, which operates with so much effect upon the manufacturing industry of our country, calling into action the inventive faculty to devise new and more economic methods of effecting certain results. The idea once originated, it is singular to trace its gradual development. In its early stage it was imagined that the harder the material out of which the pattern or design was made the better for the purpose. Keeping this then imagined requisite in view, the first ornament imprinted was made out of steel wire formed into shape, and thereafter tempered; designs of a more complicated and minute character it was expected could be produced by using metallic lace or wire web. I may here remark that this idea gave the hint which resulted in the production of the wire lace, exhibited by Mr. Carey, of Nottingham, in your recent exhibition of patented inventions. This may be cited as a forcible illustration of the effect one invention may have in stimulating or introducing a new feature into a manufacture of an entirely different kind from that in which the want originated. I now exhibit to you the result produced from a piece of crochet work in wire; it is remarkably indefinite and unsatisfactory, as the metallic wire cannot be drawn up tight into shape owing to the elasticity of the wire out of which the design is made. The loops being loose, the consequence of the pressure to which the plates of metal are subjected, in order to receive the ornamental device, cause distortion or flattening, which completely destroys the arrangement of the threads or wires.

This led to the somewhat singular idea, that in all probability ordinary thread lace could be used for the purpose of producing a device upon softer metals. I may here state that the result of this experiment was just another illustration of the saying of Sir John Herschel, illustrative of the difference between theory and practice; thus no mere philosopher in his study, could have predicted that so tender and fragile a fabric as ordinary thread lace would have sustained a pressure of not less than ten tons, and come out from such a pressure comparatively uninjured, leaving its impress even on so soft a substance as Brittania metal; but how much greater is our wonder increased when we find the same result is produced on copper, and on the harder metal, formed by its alloy with zinc, namely brass, the yet harder German silver, iron, or tin plate, and more wonderful still on what we are led to believe is the most dense and hardest metal in ordinary use, viz., steel. I now exhibit to you the first experiment made with thread lace,

which is interesting, as demonstrating a very peculiar fact, and affords a very excellent illustration of a great philosophical truth, viz., the indestructibility of matter; it was found, as will be anticipated, that the more perfect and closely twisted the thread of which the lace is made the better and more definite is the impression. The transition from rags to paper is a natural one, and patterns or designs formed out of perforated paper were next tried. From its density, the almost complete cohesion of its fibres, and their close proximity to each other, it was found on experiment, that designs formed thereof produced very satisfactory results, while in point of economy it is even superior; as a curious illustration of its capability of resisting pressure, I may state that I have myself passed through metal rolls, without injury, the same piece of perforated paper (ordinary writing paper) in the ornamentation of tin plates not less than ten times, after which it was not entirely useless, but it became hard and brittle, owing to the cohesion of the particles being destroyed by the compression it has undergone.

But by far the most useful, practical application of the inventor was yet in store; and, in economy of its reproductive powers, it bears a near relation to the multiplication of the duplicate steel plates from which the Bank of England notes are printed, and which are produced by pressure, in the first instance, from one original engraved plate, or to the production of the plates from which our ordinary penny postage stamps are printed, the original of which, up to 1842, had been only once engraved. The reproduction in the two instances last mentioned is effected by means of steel rollers, the periphery of which, by pressure on the original plate, has received an impression of the engraving in relief, and which when hardened impresses upon the surface of a soft steel plate a fac-simile of the original. The plan adopted in the present instance, and applied to the ornamentation of metal, is somewhat similar:—A steel plate very equal in thickness is selected, on which the design requisite for the ornamentation of the salver, tray, other object, is engraved in the ordinary manner, but somewhat deeper, the point of the graver employed to cut the lines being ground more acute. The engraving must be carefully executed; erasures or scapings out, or beatings up of the plate from behind, must be avoided, as where they occur they are detrimental to the appearance and uniformity of the work. The least departure from perfect flatness of surface, or equality of thickness, is fatal to the perfection of the impression. From this plate a matrix or impression is taken in German silver, steel, or other metal, by passing the plate to be used as the matrix, and the engraved plate or design to be copied from, through a pair of rolls, observing, however, that the pressure of the rolls is uniform all over the surface, or, in technical language, that the "pinch" is equal. If this has been the case, and if the pressure applied has been sufficient, the result will be, that upon the previously blank sheet of metal an impression, with elevated or projecting portions corresponding to the sunk lines in the engraved or chased original plate, will follow. This impression is then used as the medium from which to obtain the ornamental blank thereafter to be made up. This is done, as in the former instance, by placing the sheet of metal to be ornamented with its face to the plate, with the raised or projecting portions, and passing them through the rolls as before; the consequence is, that every line of the original design will be found impressed or indented into the previously plain sheet or blank of metal. The original steel plate is thus used only for the preparation of reverses, one of which, however, may be used many times in succession, or in proportion to the hardness of the metal to be ornamented. The blanks, after being ornamented, may be stamped, or spun up into shape; if of a globular or regular form of outline, if irregular, hexagon, octagon, or with bosses, the metal out of which the vessel or article is formed is ornamented in separate portions, which are thereafter bent, stamped or raised into shape, fitted and soldered together. After trimming and dressing, the plating or silvering is effected by the electro-deposit process; burnishing follows, the tools employed being burnishers made of blood-stone. Females are principally engaged in this portion of the work. As the two last processes mentioned are very generally understood, it is unnecessary to do more than simply allude to them. It may not be out of place, before concluding the notice of this method of producing surface ornamentation, to remark that the excellence, or the reverse, of the ornamentation bears a correct proportion to the original steel plate, and just in so far as the design is a good one, and the engraver of the steel plate has executed his part well, will the result be satisfactory, or in the inverse ratio; it is, in fact, just as faithful a copy upon a sheet of metal, as an engraving by Wass or Finden is upon paper. It affords a ready and cheap method of introducing good ornament in the place of unmeaning, ungraceful, inelegant, and badly-executed hand-chasing or engraving which, in general, serve to deface what they are intended to adorn.

I now desire to direct your attention for a brief period to a subject which, within the last few weeks, has attracted some notice; and though somewhat out of place in a paper proposing to treat upon the working and ornamentation of metals, yet in so far as the means employed, to impress on metal certain indentations which are to be printed from, there is no difference whatever. I here refer to the art of natural printing, for which the Austrians have preferred a claim, taking to themselves an amount of credit to which, with all due deference to them, I think they are scarcely entitled, even had the invention been one of greater magnitude and capable of a much more extended application than it really is; the process is simply that of producing on a piece of lead an impression from a natural object, such as a flower, a leaf, a feather, &c. This is done by means of rolls, as has already been shown. From the lead impression they take a copy by the deposit process, the lines of which are in relief; from this, again, they take another copy, which is printed from. The earliest application of the principle in which metal was used by the Austrians, in order to copy *lace*, appears to have taken place somewhere between May and October, 1852; but Mr. Sturges had in August, 1851, printed the two specimens of needlework and net now exhibited. It is very important to remark that the English patent for the ornamentation of metals was sealed on the 24th of January, 1852, while the patterns of lace which directed the attention of Auer to the subject, was received by them at Vienna, in May of the same year. The patent of Worrung does not appear to have been taken out until the 12th of October, 1852, three months after the English patent was specified, and when all the details of the process were explained at length in the then published specification. In the month of December of 1852, I happened to be making some experiments on the process for ornamenting metals. I used various media, impressions of which I printed from; they are now before you. Reasoning from these, I at once saw that media of even a more fragile kind than had previously been used might be impressed on metal, I therefore experimented upon decayed leaves, feathers, &c., with the most perfect success, and as I think by your examination of the specimens exhibited you will readily admit. As my time is much taken up, the range of subjects has been somewhat limited from which I have procured impressions; but these have not been produced at third hand, as has been the practice of the Austrians, Messrs. Bradbury and Evans, and, until very recently, of Dr. Branson of Sheffield. In every instance save those in which I printed from transfers on stone, taken from my Britannia metal plates, I have printed from the plate indented by the object copied. The copying from the lead by deposition, using the lead impression as a matrix, and from the plate so copied with raised lines to copy another with sunk lines, which is that used to print from, can only result in losing many of the minute touches which constitute and form

the chief recommendations of natural printing. *In printing direct I therefore stood alone.* Dr. Branson, in your journal of Saturday last, has announced that a "step in advance has been made," by *his* discovering that Britannia metal was a better material than lead to take an impression, and it could be printed from. *I made the discovery fourteen months ago,* and acted upon it. If Dr. Branson had read the *Athenæum* of the 10th December last, he would have found I made no secret of the material used by me. In like manner, as to the application of the transfer to the lithographic stone; this I had also done some weeks before Dr. Branson's letter appeared. I must, however, hazard an opinion, that when lines of an exceedingly delicate kind occur, as in the down of a feather, the stone will not print a great number of impressions clear, but will be apt to block. Where the markings are clear and distinct in the object copied, the result will be more successful, though a want of solidity in the lines (a defect inherent to transfer lithography) may be anticipated.

[Impressions printed from plates of Britannia metal and copper were exhibited and printed in the room, before the audience.]

In conclusion, it remains for me but to thank you for the attention with which you have listened to the paper just read. In treating the subject a purpose has been kept in view, viz., to try to explain the principles involved in certain methods employed for the production of ornament, and this in order to guide the industrial designer to sure and certain results. To be successful the processes involved in the production of articles of manufacture must be understood, and to this the earnest attention of all interested in the improvement of manufacture should be directed. The abstract teaching of design is comparatively valueless, and success will only be achieved when to the taste of the designer the skill of the workman is united. Without ignoring the higher walks of industrial art, that which addresses itself to the great body of the people should be specially cared for. In industrial art, as in poetry, we must have that which adapts itself to the various tastes and conditions of men. If we have Dantes, Miltons, and Shakespeares to pourtray the sublimity and grandeur of the unseen world, or express the deep, subtle, and nice distinctions which mark the mental constitution of man, we must also have Goldsmiths, Bloomfields, and Clares, who have a humbler walk, but who, not the less address themselves and give delight to a more extended circle of admirers. If in painting we have Turners, Hiltons, Maclises, and Ettys, we must also have Creswicks, Redgraves, Mulreadys, Websters, and Friths. Taking Nature for our guide, we find associated together structures the most complex and simple. Under the shadow of the rose blooms the lowly daisy; near the lordly oak the hawthorn blows. Let us, then, take care of that art which is intended to penetrate into the houses of the lowly. In doing this we may rest assured, that that which is intended to embrace a more exalted position will not be forgotten. Let us not lose sight of the sentiment so nobly expressed by the poet—blind yet bold—when he says:—

> "Beauty is Nature's coin—must not be hoarded,
> But must be current—and the good thereof
> Consists in mutual and partaken bliss,
> Unsavoury in the enjoyment of itself."

DISCUSSION.

In reply to questions from different members, Mr. Aitken stated that, from the Britannia metal plate then being printed from, on which leaves of trees were represented, he had already had upwards of 170 impressions taken. These leaves were dried; he had never attempted to transfer any in a pulpy state.

The CHAIRMAN said—of course the simpler the process the more valuable it was—and it therefore could not be denied that the nature printing of Mr. Aitken had great advantages over a system which had to pass through two or three processes to produce the same result. He apprehended there would be no chemical difficulty in printing in colours; it was purely a mechanical process. There appeared to be one point of difference between Mr. Aitken and Dr. Branson. The latter gentleman, he believed, had taken impressions of plants in their pulpy state. One of the dried leaves which Mr. Aitken had made use of he now held in his hand, and, although it was finer than the finest lace, it had not been injured by being pressed between copper plates.

Mr. AITKEN believed that Dr. Branson originally used gutta percha; and, after getting a deposit, it was transferred to metal. Where these things had to undergo two or three processes, the lines did not come out so smooth, fair, or well-defined, as when they were at once impressed on the metal. He should say that there would be a great difficulty in obtaining an impression of a leaf or flower in its soft or pulpy state, in consequence of the hardness of the metal and the pressure to which it was subjected. He then produced a coffee-pot of tinned iron, ornamented by this process, the medium being perforated paper. In reply to questions from Mr. Taylor, Mr. Aitken said he did not believe the impression would soon wear off in ordinary use; indeed he had heated tinned plates so treated and wiped off the tin, and found the impression still deeply indented into the iron. He introduced this style of ornament in tin manufacture about two years since. In Sheffield he had seen large salvers chased for 8d. each, the work being done by boys who had received no instruction whatever in drawing. By the process of pressure the manufacturer, by paying a fair sum for an engraving in the first instance, might turn out a really elegant and artistic article at less cost than that now paid for the inferior workmanship.

The CHAIRMAN believed there could be no doubt on the point, that engraving might be almost constantly reproduced by pressure. The postage-stamp was a proof of that. There were 240 heads on a sheet of these stamps, and he was afraid to say how many millions of these sheets of stamps had been printed. Yet all had been produced from one head originally engraved upon steel, which had been repeated 240 times over on a sheet by the agency of rolling, and from that sheet other impressions on plates had since been taken. The application of the principle and the proof of its costlessness might therefore be dated from the introduction of postage-stamps, though it had been previously applied to the plates from which bank notes were printed, as a means of getting exact uniformity in a difficult and intricate patttern, and thereby render the detection of forgery comparatively easy. The cost of the postage-stamps to the country was so infinitesimal as scarcely to be worth consideration in comparison with the amount they produced. He had now to propose that they should give their best thanks to Mr. Aitken for his valuable paper, and having heard that, he would advise them all to take the earliest opportunity of visiting him in Birmingham, where he would be able to show them, at the establishment of the Messrs. Winfield, even more beautiful specimens of art manufacture than those he had exhibited to them that evening.

The SECRETARY announced that on Wednesday next, Dr. John Stenhouse, F.R.S., would read a Paper "On the Deodorising and Disinfecting Properties of Charcoal; with the Description of a Charcoal Respirator for Purifying the Air by Filtration."

OXFORD FREE LIBRARY.—A set of the Parliamentary blue books has, it is said, been presented to the Oxford Free Library, at the instigation of Mr. Cardwell and one of the members for the city. It is believed that these documents may now be procured by all "free" public libraries.

UNION OF CHAMBERS OF COMMERCE.

The following letter has been addressed by the Secretary to the Society of Arts to the Secretary to the Chamber of Commerce and Shipping at Hull, in reply to a communication wishing to know on what terms that Chamber could be received into union:—

Society of Arts, Manufactures, and Commerce,
Adelphi, London, 6th February, 1854.

Sir,—Your letter dated January 21st, in which you requested to be informed whether the Hull Chamber of Commerce could be received into union by the Society of Arts, was taken into consideration on Wednesdays, the 25th of January last, and the 1st inst.

The Council has instructed me to acquaint you that whenever any institution applies to be taken into union with the Society, the point to be determined by the Council is, whether the objects of that institution are so analogous to the objects of the Society as to make it probable that the success of the two bodies would be promoted by an intimate co-operation between them.

I may be permitted to remind you that the title by which this Society is commonly spoken of—viz., the "Society of Arts," is not its full title, and does not adequately describe its object. It is the "Society for the Encouragement of Arts, Manufactures, and Commerce," and from its first institution in 1754, to the present time, it has constantly promoted the interests of Commerce as well as of Manufactures, and of the Fine and Industrial Arts.

Of late years, and at the present time, the Society has been and is engaged in many objects which must be directly within the aims of a Chamber of Commerce. Such, for example, are improvements in domestic, colonial, and foreign postage; in the laws of patents and of partnership; the decimalisation of monies of account, weights, and measures; the development of colonial resources and of colonial trade; the promotion of industrial instruction, and the establishment of trade schools; the reduction of duties which injuriously affect trade and commerce; the improvement of commercial law, &c., &c.

Within the walls of the Society the Great Exhibition of 1851 first took its rise; and the Society is now actively engaged in promoting the formation of the Trade Museum. The Society has large and increasing correspondence with the colonies, and many foreign correspondents.

Under these circumstances the Council is of opinion that an intimate co-operation between the Society of Arts and Chambers of Commerce might conduce greatly to the advantage of both bodies; and that this co-operation might best be accomplished by the union which your letter suggests.

You appear to be aware that a very large number of literary and scientific institutions, philosophical societies, athenæums, and mechanics' institutes (now 335 in number) have been received into union by this Society; and I am to add that, if the Hull Chamber of Commerce should approve of the suggestion, the Council would be happy to take it into union with the Society of Arts on the same terms as those which regulate the admission of the institutions just alluded to, viz., a subscription of 2*l*. 2s. a year. This is the annual subscription of a member of the Society, and might either be paid by the President of the Chamber, who would then become a member of the Society of Arts, or by the Chamber of Commerce itself from its own funds. In either case the chamber would receive gratis the Society's weekly Journal, and be put in possession of all such colonial and other correspondence as might be useful to the chamber; and its members, when in town, would have the privilege of attending the Society's meetings, exhibitions, &c.

If any considerable number of Chambers of Commerce should enter into union with the Society, it might be expedient to have annual or other conferences of the representatives of such chambers at the Society's house, as a centre.

I enclose a form of application, which should be filled up and returned to me, if your chamber, after considering the subject, should desire to be received into union.

I am, Sir, your obedient servant,
(Signed) P. LE NEVE FOSTER,
Secretary.

GALLERY OF INVENTORS.

Additional portraits received:—
William Cookworthy.
Jonathan Hulls.

BIOGRAPHICAL NOTICE.

Rev. John Harmar(a).

The Rev. John Harmar, who first succeeded in the practical application of machinery to the cropping or shearing of cloth, was born at Chalford Bottom, in Gloucestershire—a locality in which the manufacture of woollen cloth is still carried on. His father was a cloth manufacturer at that place, where his ancestors had settled after having accompanied, in a military capacity, the expedition of William III. from Holland, and, along with others, applied to the pursuits of commerce the industrious habits and inventive faculties of that enterprising nation.

Mr. Harmar assiduously applied himself to follow his father's business until he was twenty years of age, when his father died, and shortly after this event his son relinquished his former pursuits, and commenced a preparation for the ministry of the Gospel, by entering as a student at Homerton College, London. During the first few years of his public ministry he resided at Gosport, and for the remainder of his life was minister of the Independent chapel in Norfolk-street, Sheffield.

Mr. Harmar's conscientious devotion to the duties of his profession only allowed of the pursuit of the objects to which his inventive capacities led him, during limited and uncertain intervals, though partly urged to such efforts by the increasing claims of domestic life.

Mr. Harmar's first patent, No. 1595 in the Commissioners' list, is dated 20th of March, 1787. The invention described in the specification consisted of a machine, one portion of which was constructed for cropping or shearing cloths and fustians, and the other part for raising a shag or pile on cloth. In the cropping or shearing part of the machine two pairs of shears, of the kind then used by croppers, were caused to work over a shear board on which the cloth was extended; the shears were stopped from time to time, and the sheared cloth passed forward so as to bring a fresh portion on to the shear-board to be operated upon. In the other part of the machine a shag or pile is produced on the cloth by subjecting it to the action of teazles, set in small frames, and caused to traverse over the cloth by a crank motion.

These inventions at a subsequent period Mr. Harmar greatly improved, and took out a second patent (No. 1982), and dated 29th March, 1794. In the specification of this patent he describes and shows his improved machines for shearing cloth, from list to list, by two pairs of shears, and also two machines for shearing cloth lengthwise by means of similar shears. There is likewise an improved machine for raising a shag or pile in cloth by the action of teazles set in frames. These machines were extensively adopted by the cloth trade, and chiefly amongst those known as the "West of England" manufacturers; their adoption in Leeds and other large centres of cloth production being prevented by apprehensions of the riotous and destructive course at that time very preva-

(a) The portrait of this gentleman, in oil, has been presented to the Gallery as a gift by his surviving daughters, and was the first donation.

lent amongst the workmen when the introduction of improved machinery was attempted. Probably their readiness to adopt these and other machines may, in some degree, account for the superior character which the cloths of the West of England still maintain; and perhaps, from similar causes, the cloths of Belgium and France appear to be attaining a degree of excellence unknown in this country.

The success which attended the use of Mr. Harmar's machines led to their adoption by parties whose want of honesty and high principle induced them to neglect the claims of the inventor. Against some of these persons legal proceedings were taken, which, though eventually successful, were accompanied with so much delay, expense, and uncertainty, as to counterbalance the advantages which a favourable verdict might be supposed to confer; and the principal number of those who had infringed the rights of the patentee were therefore permitted to practise their piratical proceedings with impunity. The delays and losses connected with these proceedings induced Mr. Harmar to hope that he might be successful in applying for an extension of the term of the patent; that intention was, however, prevented by his premature death from an apoplectic seizure, in the year 1798.

Mr. Harmar's shearing machines' were extensively used for upwards of twenty years, until the improvements introduced by Mr. Lewis, in 1815, and by Mr. Davis and others at subsequent periods, led to the adoption of the shearing machines now employed.

AUSTRALIA.

ITS SHEEP FARMING AND WOOL GROWING.

On Wednesday week, Stuart A. Donaldson, Esq., formerly a member of the legislative council of Ausralia, delivered a lecture to the members of the Leeds Mechanics' Institute, on "Australia, its sheep farming and wool growing." The president (W. St. J. Wheelhouse, Esq.,) in the chair.

Mr. Donaldson, in opening his address, referred to the discovery of Australia by Capt. Cook, to its adoption by the government of Great Britain as a penal settlement in 1798, and to its subsequent progress, from the time of M'Carthy, as a wool growing country. If they considered, he said, that from exporting a few bales of wool in 1813, Australia had gone on increasing from year to year, until she exported more than all other countries at the present time, they would acknowledge with him that such a fact was a proof of the most extraordinary skill and of the magnificence of the country. The Board of Trade returns up to 1818, contained no mention of Australia as an exporter of wool, and here he might remark that in that year the ship was burnt which was bringing over the whole of the first clip exported from Australia. In 1824 the whole of the foreign wool imported by Great Britain, amounted to about 30,000,000 lbs., of which Australia only sent 350,000 lbs., or less than one-third of a million, whilst in 1853, a period of less than 30 years, she sent 50,000,000 lbs.—or nearly double the amount sent by all foreign countries in 1824. It would be interesting to trace the increase in the importation of Australian wool since 1824, and the figures which he should quote were based upon the number of packs, which were calculated to weigh 240 lbs. each.

		Packs.			
In 1820	they imported	414			
1824	"	1595	increase	285	per cent.
1828	"	6550	"	310	"
1832	"	9904	"	51	"
1836	"	20,820	"	110	"
1840	"	40,508	"	94	"
1844	"	73,270	"	81	"
1848	"	125,144	"	70	"
1852	"	180,294	"	45	"

In 1849 they approached the development of one of the most extraordinary events ever recorded—the discovery of gold in Australia. He drew their attention to this fact to point out another very important one, viz., that since 1849 the increase in the importation of Australian wool had very materially diminished, and, for the interests of the manufacturers of Great Britain, alarmingly so. From 1849 to 1853, the increase, instead of doubling itself in the same rate as preceding that period, had been very small.

		Packs.		
In 1849	the importations were	149,062		
1850	"	164,729	increase	10½ pr.cnt.
1851	"	174,818	"	6¼
1852	"	180,294	"	3¼
1853	"	188,658	"	4 6-10

So that, instead of an increase, doubling itself four or five times, they had only an increase, from 1849 to 1853, of 26 per cent. There was an apparent increase in the per centage of 1853 over 1852, but he did not think it was a real increase, as in the last year there was a much greater quantity in grease. If they examined the imports of wool they would find they had varied considerably in favour of Australia, varying from 27 per cent. in 1844, to 51¾ per cent. in 1851, or more than half of the wool imported into great Britain. Now while this had been going on, the importations from other countries had been diminishing. Germany, which used to be the great wool exporter to England, only sent, in 1851, 34,807 packs, and in 1852, 53,462 packs; whilst Australia sent 180,294, or nearly three times the quantity. With regard to Spain, from which they were accustomed to receive as large supplies as from Germany, her decadence had been great indeed, and in 1851 her exports to Great Britain had fallen down to 5,198 packs, and in 1852 to 972.—As to the proportionate supply, the whole of the importations from British possessions in 1851 were 218,133 packs, of which Australia produced 174,818; in 1852 the total imports were 239,908, of which Australia produced 180,294. The whole of the foreign imports in the latter period were 140,993, or only little more than half of that by the British possessions. He wished, however, to go further, and to show that whilst they had drawn from Australia such enormous quantity of wool in past years, they must not expect to do so in years to come for if labour continued so dear, and the increased population consumed the surplus mutton, instead of the sheep graziers having to boil it down for tallow, it could not be done. The Board of Trade returns for 1853 were not yet made up, but from returns to which he had access, he might say that the importations of wool from Australia in 1852 would be 188,000 packs, or only an increase of 8000. From Germany he estimated the imports for 1853 at 31,137 packs against 53,462 in 1852. The imports from the East Indies shewed a large increase in 1852 over 1851, but this he was informed arose from an accumulation of stock in the interior, and was not likely to occur again. From Southern Russia the imports in 1852 showed a large decrease. So that on the whole there was no prospect of any increase beyond the infinitesimal increase of 8000 packs from Australia. He then alluded to the gold discoveries of 1851, remarking that Mr. Clark, Sir R. Murchison, and other geologists had previously declared Australia to be a gold country, and that it was now producing gold worth £20,000,000 sterling a-year. A few years ago and the produce of the world was only £3,000,000 sterling. The annual produce of Australia in wool and gold alone was worth £25,000,000 sterling. The exports to Australia for the years 1852-3-4 would not fall short of £15,000,000 sterling; and he would venture to say that in the course of 1854-5 their business with Australia would not be less than £20,000,000. The whole of the British exports were only some £60,000,000, so that if Australia could take £20,000,000, or one-third of the whole, they must be satisfied it was a most magnificent country. As to emigration, any man who organised

judicious and sound system of emigration would be entitled to be considered as the apostle of progress, for he would place men, who were in this country more or less in a state of dependence, in a position where they would have a fair field and no favour. There was nothing which they could do for Australia at present so important as to promote female emigration. The country was deficient in females, and it was impossible to conceive the abject destitute state of the unmarried labouring man in the interior of Australia. He then proceeded to describe the settlement of a sheep station, observing that no man ought to commence with less than 5000 sheep, and that there was no artificial feeding, the sheep being fed entirely on the natural herbage.

In acknowledging a vote of thanks, Mr. Donaldson said, that it was a great mistake to suppose that droughts were the characteristics of Australia—they were the exception—the phenomenon occurring but occasionally. He had resided in Australia for many years, but he had never seen anything worthy the name of a drought since 1839. It was also a mistake to suppose that the boiling down of sheep was necessitated by droughts. The boiling down of sheep arose from the sheep masters being unable to dispose of their surplus stock, but now that there was a population to consume the surplus, they would hear no more of boiling down a sheep for tallow. True there were hot winds in Australia, but they were not so bad as the cold winds of March of this country. He gave his shepherds £35 a year, with the following rations weekly—10lbs. of meat, 10lbs of flour, 2lbs. of sugar, ¼lb. of tea—whilst in this country 11s. a week, or £28 a year, without rations was considered a high wage.

VILLAGE LIBRARIES.

Mr. James Hole, Honorary Secretary to the Yorkshire Union of Mechanics' Institutes, has just issued a statement relative to the Village Library in connection with that Union, from which the following is extracted:—

Some months since the Committee of the Yorkshire Union of Mechanics' Institutes called the attention of the public to the importance of establishing libraries in villages and other places where neither a library nor a Mechanics' or similar institute existed. A committee was formed for receiving donations, and the sum of £138 was obtained. Upwards of 800 books were purchased, of which 300 have been sent in sections of 50 to the following places—Rothwell, Hemsworth, Pool, Hatfield, and the Leeds Model Lodging House. Ten sections of 50 volumes each are at Leeds, ready to be forwarded to any places in Yorkshire requiring them. The conditions prescribed by the central committee may be thus briefly stated:—Fifty volumes of books will be forwarded to any place where there are 25 subscribers at 1½d. per week, or 1s. 6d. per quarter, and a person willing to take charge of the books. Every additional 25 subscribers are entitled to 50 additional volumes. The books are changed every six months. Ten per cent. of the subscriptions will be paid to the local librarian, as an acknowledgment for his services. The cost of boxes, which are also adapted for book-cases, register and issue books, cards of membership, and carriage of the books to and from Leeds, is defrayed by the central committee.

In their endeavours to establish the library, the committee have met with objections of the most singular character, but most of which, when analysed, obviously arise from a dislike to encourage the smallest degree of intellectual taste in the labouring classes. It has been said that the subscribers have no control in the selection of books, or management of the library; that religious works are excluded; and that the sum demanded is more than working men can afford. To this it is replied that, wherever there are 50 subscribers at a station, they can nominate a representative to assist the central committee in the task of management; that the library includes several standard religious works; that none are of a sectarian or controversial character; and that 1½d. per week is very often wasted many times over in dissipation.

THE GUANO DEPOSITS OF THE CHINCHA ISLANDS.

A note has been received at the Peruvian Legation from the Minister of Finance of the Republic, bearing date the 24th of December, in which the following is communicated to the chargé d'affaires:—"The government nominated a deputation, composed of M. Charles Faraguet, a French engineer in the service of Peru, and many other engineers and professors of chemistry, native as well as foreign, in order that they might undertake the measurement of the guano of the Chincha Islands. This therefore has been effected, by men best qualified for the purpose, with as much accuracy as could possibly be obtained, adopting the latest improvements in the scientific proceedings, and the following result has been given:—That the island situated at the north contains 4,189,477; the centre island, 2,505,948; the south island, 5,680,675; or a total of 12,376,100 tons. This aggregate indicates tons of measurement which will yield an increase of one-third when reduced to tons of weight, which are those sold in the market. Calculating on this well-known fact, the above 12,376,100 tons will yield 16,501,466 tons of weight saleable. Besides the Chincha Islands, it is well known that Peru possesses many other guano deposits, containing a very considerable quantity, the measurement of which has also been ordered by the government, and will be published in due course. The reports of the deputation are now being printed by order of the government." In addition to the preceding, the original plans formed by the engineers, reduced to a small compass, have been transmitted to the Legation for the purpose of having a sufficient number of lithographic copies executed, to be forwarded to Lima as early as possible, to be added to other documents that were about to be printed for publication. The government has authorised the chargé d'affaires to publish, as he may deem convenient, the plans of the islands in this or any other country of Europe.

Mr. James Caird, in a letter to the *Times*, relative to the above despatch from the Peruvian Government, says:—"There can be little doubt that there still remains a sufficient supply of Peruvian guano to satisfy the probable demands of more that the present generation. But in the meantime the guano market is closed,—and why? Because the agents of the monopoly had no expectation of such an increased demand as had lately arisen, and made provision for only an average year's consumption. Can any better reason be given to show the utter inadequacy of any single house of agency attempting to regulate the supply to the ever-varying demands of a whole nation? While we have been thus left to the most injurious effects of this monopoly, the Americans have imported no less than 70,520 tons of guano from Peru during the last year, and a much larger quantity is said to be arranged for in the current year. This is, no doubt, the effect of the measures which the President announced in his Message he had felt it is duty to take to secure for his countrymen a better supply. Is there no Member of Parliament who, feeling the importance of this question to his constituency, will ask the Government whether any measures of a similarly effective character have been taken to secure for us a better supply?"

PRINTING PARLIAMENTARY PAPERS.—A select committee, consisting of the Speaker, Mr. Strutt, Sir J. Young, Mr. Hamilton, Mr. T. Greene, Mr. Wilson, Mr. Beckett, Mr. Divett, Mr. Gaskell, Mr. Hume, Mr. V. Smith, and Mr. Sotheron, met on Tuesday week for the first time, to consider all matters relating to the printing executed by order of the house, and for the purpose of selecting and arranging for printing the returns and papers presented.

THE RIVER LEE.

At the Institution of Civil Engineers, on Tuesday week, a paper was read "On the Navigation and Drainage Works recently executed on the tidal portion of the River Lee," by Mr. N. Beardmore, M. Inst. C. E. The first part contained a general description of the ancient navigation of the River Lee, and of the gradual improvements introduced into the class of barges frequenting it, and the burthens carried by them. Allusion was made to the difficulties and continual delays which had prevailed, up to a very recent period, in the tidal portion, forming the junction with Bow Creek and the Thames, at Limehouse; difficulties which were aggravated by the navigation being the common supply for five tidal mills.

The new works consisted of stop-gates, across the main Channel of the Lee, near Old Ford Lock, established for preventing the water from being drawn down by the tidal mills to the eastward; also a lock for a similar purpose and to pass barges on St. Thomas's Creek, near Bow Bridge; and a new overfall, to pass surplus water to the Three Mills.

Three large new floodgates, each 18 feet in width, were constructed near Four Mills, with a new tidal lock, adjacent to the spot, in order to pass vessels into Bow Creek; the ancient system being to pass craft by a single pair of gates, only available by drawing down the head water and, frequently, during neap tides, the water did not rise high enough to enable the gates to be opened at all.

The remaining new works consisted of a lock at the east end of the Limehouse Cut, to retain the water when, in consequence of floods, the Bromley flood-gates were required to be opened; the lock being of such a width as to allow vessels of 21 feet beam to enter the cut; the former lock being only capable of admitting barges of 18 feet 6 inches beam.

In consequence of the treacherous nature of the material at the Bromley end of the Limehouse cut, it was necessary to re-excavate the cut,—to give flatter slopes, and also to build retaining walls of Kentish rag, for the towing path.

The paper concluded by alluding to other considerable works which had been recently executed, at the lower end of the navigation, where it formed a junction with the Regent's canal basin, thus giving access to Armstrong's hydraulic coal lifts and cranes, with the dock conveniences and the wider locks, recently executed by Mr. W. Radford, for the Regent's Canal Company.

AUBE'S PATENT FOR THE MANUFACTURE OF WOOL.

An application was made to the Judicial Committee of Privy Council, on Wednesday week, on behalf of the directors of Price's Patent Candle Company for the prolongation of a patent, of which they had become the assignees, which was granted on the 7th of May, 1840, to M. Aubé, for the improvement of the manufacture of wool and other stuffs. In carrying on that process a large quantity of olive, or other vegetable oil of an expensive nature, was necessarily employed, and recourse was afterwards had to a very offensive mode of removing it. The patentee discovered that, in the manufacture of stearine candles, there was produced what he called oleic acid, the application of which to wool produced a better twist in the yarn and a stronger and firmer cloth than the former mode of preparing it, and by which the offensive materials before used were dispensed with. It had also a tendency to prevent spontaneous combustion. Many difficulties, however, were encountered in its introduction, and it was only recently that its advantages were beginning to be appreciated. The patentee died some years ago, but one of his representatives, on visiting the Great Exhibition, was introduced to Price's Candle Company, and having ascertained that they produced oleic acid in large quantities, and which was regarded by them as almost useless, arrangements were made for the sale of the patent, for which they were to pay 1,000*l*. per annum until its expiration, and the same amount for any period to which it might be extended.

Sir F. Thesiger, having addressed their lordships, was about to call witnesses in support of the application, when

Mr. Baron Parke said that, there being a foreign patent, their lordships were of opinion that, under the 15th and 16th of Victoria, cap. 83, sec. 25, if they were to extend the English patent, it would be invalid. The application, therefore, must be refused.

JONES'S PATENT FOR THE MANUFACTURE OF STARCH.

An application was made to the Judical Committee of Privy Council on Wednesday week, to renew a patent granted in 1840 to Mr. Orlando Jones, since deceased, for improvements in obtaining starch and other products from farinaceous matters. Instead of procuring starch from wheat by means of fermentation, he resorted to rice, from which he obtained it in a pure state by applying a weak solution of caustic alkaline. He subsequently discovered that a part of his patent had been anticipated by a Mr. Wickham, and that part he disclaimed. Application was now made for a prolongation of that part which remained valid. Two parties appeared to oppose it.

Mr. Atherton having stated the facts,

Mr. Baron Parke said, their Lordships were unanimously of opinion that no merit whatever attached to the original invention: the principle, though the fact was not known to Mr. Jones when he took out his patent, had been discovered before. The application must be refused, with cost to the extent of 100*l*., to be divided between the two opposing parties.

Home Correspondence.

RUTHVEN'S PROPELLER.

Sir,—Can any of your correspondents explain the difference between this propeller and that patented by Buck, dated July 10th, 1835, Rep. vol. vi. N.S. p. 15, the title of which is "Improvements in Propelling Boats, Ships, and other Floating Bodies." ? The principle is that of "Barker's Mill," in both cases, different mechanical arrangements being adopted for raising the necessary columns of water.—I am, Sir, Q.

CONTINENTAL SCHOOL-BOOKS.

Sir,—The Council of the Society of Arts did me the honour, last summer, to ask me to make some inquiries regarding the school-books and educational apparatus in use on the Continent. A schoolmaster, during the holidays, in search of health, is an unsafe commissioner to receive such a trust; and I regret that, after a long interval, I can offer to the Society nothing better than the titles of a few books and diagrams, compiled from confused and incoherent notes.

It is possible, however, that my poor list may be of use to some readers of the Journal; and I shall be very glad if it contributes any help towards the formation of the great collection of educational books and apparatus which I understand the Council has still in contemplation. I will present what I have to communicate under the following heads:—1. Natural History. 2. Physics and Chemistry. 3. Physical Geography and Mercantile Products. 4. Wall Maps and Diagrams. 5. Drawing. 6. Miscellaneous. And, lest I should encumber the pages of the Journal with what is comparatively worthless, I will send three short letters for insertion in three successive numbers.

1. Natural History.—It is greatly to be regretted that this branch of instruction has been so much neglected in our English schools. In many German schools it has long been pursued as part of the regular course—perhaps in none more successfully than in the commercial schools of Leipzig, which are under the superintendence of Dr. Vogel. The three small manuals used there are those of Reichenbach, "Naturgeschichte des Pflanzenreichs—des Thierreichs—des Mineralreichs. Leipzig, 1840." Another work, which attracted my attention elsewhere, is that of Leunis, "Synopsis der drei Naturreiche." (I forget whether the "Schul-Naturgeschichte," by the same author is the same work or another.) The manual used at the Higher Commercial Institute at Leipzig, under the care of Dr. Steinhaus, is that of Schoedler, "Das Buch der Natur. Vieweg and Son, Brunswick. 6th Ed. 1852." Besides the elements of natural history, it contains what would more naturally be ranged under the next head.

2. Physics and Chemistry.—The firm which I have mentioned (Vieweg & Son, Brunswick), seems to be the chief publishing house in Germany for elementary works on physical science; and the attention of the Council will doubtless be directed to their catalogue. I have thought it worth while to select the following from their list:—Hellmuth, "Elementar-Naturlehre. 14th Ed., 1852." Müller, "Grundriss der Experimental-Physik. 3rd Ed." Schoedler, "Die Chémie als geistigbildendes Moment für den Unterricht in Gymnasien;" also, Stöckhardt, "Die Schule der Chemie. 7th Ed.;" Müller, "Grundriss der Physik und Meteorologie. 2nd Ed.;" Fliedner, "Aufgaben aus der Physik;" and Pouillet-Müller, "Lehrbuch der Physik und Meteorologie." The chemical manual used by Dr. Steinhaus at Leipzig is, Gottlieb, "Vollständiges Taschenbuch der Chemischen Technologie, 1852." Another elementary work which I saw in the same city is Heussi, "Experimental Physik. Berlin, 1852." The books published in France on the rudiments of physical science are very numerous. Those which are most approved would probably be ascertained by consulting such catalogues as those of Hachette, Langlois and Leclercq, &c. I may just mention Bobierre, "Leçons Elémentaires de Chimie appliquée aux Arts. Masson, Paris."

I am aware that an enumeration of books is very imperfect without a statement of the prices and a description of the contents. But I was able only to take very hasty notes, and several months have elapsed since I took them. Next week I hope to send a notice of some of the books and maps used on the Continent in the teaching of physical and commercial geography.

Faithfully yours,

J. S. HOWSON.

Collegiate School, Liverpool,
Feb. 3, 1854.

THE *EXAMINER* AND THE INDUSTRIAL CONFERENCE.

Sir,—Some years back the *Times*, alluding to an article in the *Examiner*, ignored its title, and designated it as a "low Sunday print." In an elaborate article the editor of the *Examiner* set about to prove that it was not a low Sunday print. I for one believed it; for it had not then put forth the article of February 4, 1854, entitled "The Socialist Conference of the Society of Arts." Anything lower in taste, spirit, and wilful perversion of facts, it has not been my lot to experience. Only Mrs. Malaprop could rival it. By the term "low" I understand the mind of a writer, who, assuming the style and title of an *examiner*, remains in a condition of wilful ignorance, or who, not being ignorant, wilfully misrepresents or promulgates direct falsehoods. From these charges the writer in the *Examiner* cannot escape, and he has not even the miserable cloak of wit to cover his garb of wickedness. The *Examiner* says:—

"And out of all the miserable talkers there was only Mr. Henderson, Sir Charles Fox's partner, to remind them that, after all, wages *must* be regulated by the law of supply and demand. Of course all ended in disappointment."

This mock examiner wilfully ignores the fact that one of the earliest speakers was Mr. Richard Fort, a gentleman of wealth and position, son to one who had made a large fortune by trade, a man of classical education, and as conversant with political economy, and supply and demand, as Mill, Mac Culloch, or any known writer, and who emphatically laid down the painciple—not contested by any one at the meeting—that no combination of markets or men could lower or raise the price of wages one iota.

Mr. Pryme, Professor of Political Economy, at Cambridge, and others, spoke in the same strain, as well as Mr. Henderson.

The *Examiner* wilfully suppresses another fact, admitted by Mr. Henderson and the whole meeting, that the existing law of partnership operates to impede the economy of production, and that it would be a possible thing for intelligent workmen to share profits in a factory as well as in a railroad.

"Speeches after speeches insisted on the 'right' of labour to participate in the profits of capital."

This is wilful misrepresentation. The whole gist of the matter was to show that willing workmen, placed in a position to increase their earnings by care and diligence, would thus materially add to the profits of the capitalist, and that practically such modes of working existed in many branches of trade and commerce. To this effect went the speeches of Mr. Slaney and Mr. Hindley.

The true object of the conference was, as I take it, to break down the ill feelings that might exist between employers and workmen, to bring them closer together, and to devise means, not of fixing the rates of wages, but to prevent the growth of disputes by ignorant misapprehension. And one fact came out strongly—that many employers treated their workpeople like brutes, rather than as human beings, and that the workpeople revolt at it; and that this, even more than the question of wages, is a source of bitterness. All means to obviate their evils the *Examiner* scoffs at, and says, "they must be fought out." This is a sentiment worthy of a butcher, but not of a man. It is the doctrine of a dogmatism, but not of a philosophic examiner—an offended "Sir Oracle."

The writer writes as one of the flunkey school, not having the fear of Thackeray before his eyes:—

"Lord Robert Grosvenor had not one supporter of any note in politics, commerce, manufactures, or society." . . . "In the absence of men of influence." . . . "Mr. Henderson, *Sir* Charles Fox's partner"—not of the firm of Fox, Henderson, & Co., as mercantile men speak."

All this is in the "tuft-hunting" spirit that refers every thing to "men of influence," whether good or evil, and affects to look down on other humanity—that will rub shoulders with notorieties, if possible, and gets very angry with lords who exhibit the "cold shoulder." Just such a man we recollect, when first elevated from obscurity to become the henchman of a fashionable Count, not of over strict morals. At a fish dinner at Blackwall, seated by the Count's side, the *parvenu* was boiling over with impatience to be the observed of all observers. He could not lose his opportunity, and time was slipping away; at length he burst out with a kind of *apropos des bottes* to one of the waiters,—"Damme, Sir! don't you see that *the Count* has no bread."

Not thus did the *Examiner* earn its repute in the elder time, and not even its name can preserve it from disrepute, if it permits writers of the Jenkins school to lucubrate in morals and politics, as well as literature; assuredly not by permitting the promulgation of direct and gross falsehood under the semblance of examination. The writer in the *Examiner* has got "by rote" some parts of his Adam Smith, but cannot "spell it" or apply it, still less work up to the further doctrine that Adam Smith

would have done had he lived to witness modern appliances. A marvellous change has come to pass when the *Weekly Dispatch* is in advance of the *Examiner* in the processes for building up a great nation. While the one grows into a philosopher, the other remains as a miserable narrow martinet.

Yours respectfully,
CARDAUS.

THE PATENT LAW DISCUSSION.

SIR,—A serious error occurred in the report of a remark made by me at the discussion on the patent law. What I really said was that "the American law allowed any person, whose patent was rejected, an appeal to the chief judge of the district of Columbia, but that this appeal was not taken in one case in ten. When the applicant acquiesced in the rejection of the patent office, and declined to appeal, two-thirds of the preliminary fee was returned. When an appeal was taken, *no return* of the fee was made." I also added, in reply to Mr. Prosser's question, that I had known many cases in which applicants were satisfied with the justice of the rejection, and gratified at being saved the expense and trouble attending a useless patent. Yours, &c.,

C. F. STANSBURY.

Proceedings of Institutions.

BATTERSEA.—On Tuesday evening Mr. A. Coleman, of Wandsworth, delivered a very instructive Lecture, to the members of the Literary and Scientific Institution, on Salt, (Chloride of Sodium). The lecture was divided into six heads, viz:—Its geographical distribution; Its manufacture; Its uses in the arts; Its chemical composition; Its importance in the animal economy, and its uses as a manure. The lecture was well illustrated by a variety of brilliant experiments. After the lecture the Rev. J. S, Jenkinson, the Vicar, and the President of the Institution, proposed a vote of thanks to Mr. Coleman for his services. He then said. it was his pleasing duty, this evening, to present Mr. Buckmaster, the honorary secretary, with a silver tea service. He was sure he was deserving this mark of approbation. He might say that the Institution was greatly indebted to him. Its prosperity and success were mainly due to his exertions. He was pleased with the manner in which the business had been conducted and to have this opportunity of rewarding merit; no great effort had been required, and many had subscribed who only knew Mr. Buckmaster through the success of this Institution. The subscription list was open only a short time, but nearly all the members subscribed. Mr. Buckmaster, in returning thanks, referred to the altered character of these Institutions since their formation by Dr. Birkbeck. He observed that it was for the elevation of the working classes that we ought to labour; that the mechanic should understand the principles of his art, should be able to explain the laws and processes which he turned to account, that instead of working as a machine he should join intelligence to his toil. This great idea of the elevation of the labourer was no longer listened to as a dream; the greatest minds were now working to make it a practical reality. The tea service was manufactured by Garrard and Co., in the Haymarket, at a cost of 40 guineas.

COUPAR ANGUS.—The nineteenth anniversary of the Mutual Improvement Society was celebrated in the meeting room of the Institution, on the evening of the 7th instant, Mr. James Simpson, president of the society, occupied the chair. Owing to various causes the attendance of members was not so numerous as on some former occasions. This being the case, instead of listening to speeches the members present resolved themselves into a committee for the general discussion of speculative, literary, and scientific subjects. During the past year important additions have been made to the comparatively large and valuable library of the society; and being one of the Institutions in union with the Society of Arts, it receives the Weekly Journal of that body, as well as other periodicals. The sole object of the Mutual Improvement Society being mental, moral, and physical elevation, its library is open to the public at the nominal charge of one penny per week, and poor persons, who are unable to pay even this small sum, are allowed the use of books gratis.

DUNMOW.—The annual *soiree* of this Institution was held on the 14th instant, and was most fully attended. The President, the Rev. C. L. Smith, announced that arrangements had just been made for commencing the enlargement of the Town Hall, so as to provide ample space for all departments of the Institution. He also stated that a great addition had been made to the number of volumes in the library by the liberality of the members, and especially of the Noble Patroness, the Viscountess Maynard, who was present among them. The magnificent copy of the Scriptures presented by her ladyship was exhibited. The President then explained the facilities for purchasing new works, on highly favourable terms, through the agency of the Society of Arts, and trusted that in the ensuing year, when a fresh stimulus would be given to the Institution by the improvement of the Town Hall, a considerable sum might be devoted to this purpose. The meeting was ably addressed by several members, of all classes, the intervals being filled up with the vocal and instrumental music of amateurs, and with a short lecture from the President on the subject of the Black Sea. He pointed out the erroneous notions of the ancients and writers of the middle ages respecting the extent of this sea; and gave an account of the various names under which it had passed; deriving its modern appellation from the dark hues thrown on its waters by frequent fogs. He mentioned the fact of its being the least salt of all the seas which had been hitherto chemically examined; and described the current which sets from it through the Bosphorus, the little that was known of its soundings, and the naval insecurity of its southern shore. He gave a succinct account of the Sea of Azof, Sebastopol, the Bosphorus, Constantinople, and the Dardanelles; and while dwelling on the last of these, he mentioned the story of Hero and Leander, to which he said he should hardly have ventured to allude, had he not remembered that this was Valentine's day, when a tale of love might be told with more propriety than at any other season. The meeting concluded joyously with the National Anthem.

FAVERSHAM.—Mr. William Parsons gave a lecture on Monday, the 16th of January, at the Public Rooms, before the members of the Literary and Scientific Institution, on the Works of Thomas Hood, the English Humourist, with readings from his works, and illustrations of his songs. The following syllabus will convey some idea of the details of the lecture:—Part 1. Definition of true poetry—Its various manifestations—Original bent of Hood's genius, as evinced in his earlier poems—Their comparative neglect—Wit and humour—Hood's genial and kindly spirit as a humourist—More chastened development of his humour when free from uncurbed conceits—Effects of higher aims upon his powers, as shown in his later poems. Part 2. Combination of humour and pathos—Hood's earnest and large-hearted sympathy with want and suffering—His purpose of assisting to redress the social wrongs of the age, and the eminent success of his first efforts—His enthusiasm in the cause, unsubdued by ill-health, and arrested only by his death. Miss Wellar gave illustrations of several of the songs; among these "It was the time of Roses," and "The Song of the Shirt," were much admired. On Thursday week, Mr. Parsons delivered a second lecture, entitled "An Evening with Thomas Moore." The syllabus of this lecture was as follows:—Part 1. Literary men—The early life of Thomas Moore—College friends—Reception of Moore in

London—Literary associates—Lyrical poetry—Its characteristics—National poets—Burns and Beranger—Moore and his Reviewer. Part 2. Eastern romances—Satire—Satirical powers of an ancient Bard of Erin—Estimate of the character of Thomas Moore—Concluding observations. The remarks of Mr. Parsons were those of an able critic. Miss Wellar again assisted in the illustrations, and gave the melodies "Rich and Rare," "Common Sense and Genius," and "The last Rose of Summer," with great effect. The above lectures were most numerously attended, and gave universal satisfaction.

LEEDS.—Mr. R. W. Buss, the artist, has been giving his four lectures on Humorous and Satiric Art, with great *eclat* at the Mechanics' Institution and Literary Society. The idea of examining this branch of Art, which, in a certain sense, is truly historical, both æsthetically and in relation to the events the several sketches introduced in illustration are designed to render ludicrous, has a great deal of originality, and, as developed by Mr. Buss, yielded much instruction, both as regards the principles of art and its use as a powerful corrective of vice, affectation, and folly.

LEEK.—The annual meeting of the Literary Institute in this town took place on Friday evening last—the evening being made up of a grand concert and ball. For the concert, singers of considerable talent were engaged from London and Manchester, and their performance went off with great *eclat*. The ball which followed was equally successful—and was carried on for four or five hours with the utmost good feeling. W. D. Ainger, Esq., on taking the chair at the Concert, addressed the members in an effective and appropriate discourse, urging the necessity of keeping pace with the age in the pursuit of knowledge, literary and scientific. He also congratulated them on the prosperous condition of the institute, which, during the last three years, had nearly doubled itself in numbers, and had more than doubled its position and influence in the town. At the conclusion of the address a vote of thanks was carried by acclamation.

MALDON—The thirteenth Annual Soirée and meeting of the Literary and Mechanics Institute was held on Thursday week, the President, the Hon. G. A. Byron, in the Chair. Mr. W. K. Digby, the Secretary, read the report, which stated that the number of volumes in the library was 1.196, and the entries of those taken out to read was, 3,762. The receipts, including a balance of £2 11s. 11d. from last year, amounted to £94 18s. 6d. and the expenditure left a balance in hand of £2. 19s. Subsequent to the accounts being made up, the Hon. G. A. Byron had forwarded a cheque for £5. Addresses were delivered by the Chairman, and Mr. J. J. Mechi; and the former, in responding to a vote of thanks, offered to furnish the Institution with such books of travels as he might possess, that were not already in the library.

SOUTHAMPTON.—The annual *soiree* of the Polytechnic Institution took place at the Victoria Rooms on Tuesday week, and the proceedings throughout afforded to all present unmixed delight and satisfaction. In opening the proceedings, the Mayor congratulated the assembly upon the high position which the Institution at present occupied, contrasting it with its condition when he and a few others met together some years ago in the school-room of the Baptist Chapel in East-street, and succeeded in forming it. He concluded with some encouraging remarks to the Committee to persevere in their labours. Mr. Weston, the Secretary, then read a report, which, after alluding to the value and necessity of Institutions of this discription, showing that considerable progress had been made during the past year, the number of members having reached to nearly 600, and a corresponding increase having also taken place in the numbers requiring books from the library, the circulation being now more than 260 weekly, or about 13,500 yearly. The report next alluded to the proceedings of the Committee relative to the carrying out of the resolution of the special meeting of members held on 11th of October last, authorising the purchase of the Victoria Rooms and grounds, and the building of a large lecture hall for the purposes of the Institution; expressing a confident belief that with the exertions of the members the day was not far distant when the desired object would be accomplished, and an opportunity thus given for increased usefulness in providing mental and moral instruction for the people of Southampton.

Miscellanea.

THE LAWS OF ENGLAND AND SCOTLAND.—The London Committee of merchants and others, associated for the assimilation of the commercial and bankruptcy laws of the United Kingdom, are now in communication with the commercial societies of Liverpool, with the view of promoting this important movement. The first great step towards its accomplishment is the bill which was introduced by Lord Brougham last session of Parliament and read a second time, having for its object the assimilation of the bankruptcy systems of England and Scotland. Another great step in the direction of assimilation is a bill about to be introduced into Parliament for the extension to England of the Scottish system of recovering by summary procedure on bills of exchange. By that cheap and speedy method of recovering payment the holder is enabled, without bringing an action, to sign judgment when the bill is dishonoured, and after six days' notice to issue execution. Nor is the debtor allowed to dispute the bill until he finds two sufficient sureties for debt and costs; and not even then, unless he can satisfy a judge, at the outset, that he has *prima facie* reasonable and honest grounds for refusing payment.

THE COINAGE OF 1853.—There were coined at the Mint in 1853, 10,597.993 sovereigns, 2,708,796 half-sovereigns, no crowns or half-crowns, 3,919,950 florins, 4,256,188 shillings, 3,837,930 sixpences, 16,038 fourpences, 36,168 threepences, 4,752 silver twopences, and 7,920 silver pence (of these last two coins the same number is printed every year, for Maunday money), 1,021,440 pennies, 1,559,040 halfpence, 1,028,628 farthings, and 955,224 half-farthings. The total value of the coinage of the year was £12,663,000; the average of the previous five years was only £4,000,000.

CRYSTAL PALACE ORGAN.—Mr. James Rock, Jun., writing to the Secretary, says:—"Has it ever occurred to the directors of the company to enquire what would be the effect of placing the pipes *horizontally*, with their open ends in the direction of the length of the building? It seems natural to suppose that they would be more effective as to sound, if placed in that position than in the vertical one, which, for the sake of convenience as to space, is generally adopted. Whether or not the musical result would be equally good, is another question."

THE GLASS TRADE.—A series of interesting lectures under the title of "Winter Evening Recreations," are being delivered by various gentlemen belonging to the locality, in the Athenæum, Sunderland. The public and the working-classes are admitted to the body of the hall free. Mr. James Hartley, the extensive glass-manufacturer, in a lecture recently delivered on the art and manufacture of glass, gave the following interesting facts in reference to that trade:—"Previous to the repeal of the glass duty in 1845, there were 14 companies engaged in the manufacture of crown and sheet glass; they were increased during 1846 and 1847 to 24, and now are reduced to 10. In 1844, the last year of the duty, there was made by the 14 companies 6,700 tons of crown and sheet glass, paying £500,000 duty; there are now 10 companies working 40 furnaces, with 284 pots, making 35,500,000 feet annually, equal to 15,000 tons, value £225,000, being an increase of considerably more than cent. per cent., and at a charge to the public of less than one-half of the former duty. In polished plate there are six companies, being the same as existed in 1837, and, consequently, their number has remained stationary since the repeal of the duty, but their production is estimated to have doubled. They now make 3,000,000 feet polished plate annually, equal to 5,500 tons, valued at £450,000. Of Hartley's patent rough plate, which has only been fairly in the market about two years, the quantity now manufactured annually is 2,240,000 feet of 2lb. to the foot, valued at £30,000. The produce of the little kingdom of Belgium, the greatest glass producing country in the world, is 50,000,000 feet of sheet glass annually, equal to 22,300 tons, or 25 per cent. more than is made in England of both crown and sheet glass. They export of this quantity 85

per cent., of which 6 per cent. comes to England, and they retain 15 per cent. for home consumption; England retains 85 per cent. of its produce for home consumption, and exports 15 per cent., being about double what she imports. In Hartley and Co's glass tariff there are 7,329 figures; also 17 descriptions of glass, with 51 thicknesses."

DECIMALS.—The Committee of Council on Education has just issued a circular to her Majesty's Inspectors of schools, calling attention to the very strong feeling in the country that we should adopt a system of decimals in our coinage, and in our weights and measures, and requesting them to urge on the principals of training schools the importance of thoroughly imbuing the students under their charge with such a practical knowledge of decimals as will enable them to disseminate the information needed to accompany such a change.

A NEW METAL.—A very remarkable discovery was announced to the Academy of Sciences by M. Dumas in its last sitting. He stated that M. Saint-Clair Deville had succeeded in obtaining from clay a metal as white and brilliant as silver, as malleable as gold, and as light as glass. It is fusible at a moderate temperature. Air and damp do not affect this metal, which is called aluminium; it retains its brilliancy, and is not affected by nitric or sulphuric acid, either strong or diluted, if the temperature be not raised. It is only dissolved by very hot chlorhydric acid. Several specimens of this metal were exhibited to the Academy, and, on the proposition of Baron Thenard, it was voted unanimously that a sufficient sum should be placed at the disposal of M. Saint-Clair Deville to enable him to make experiments on a large scale.—*Paris Paper.*

NEW LIFE-BOATS.—A trial of a new life-boat took place on Tuesday last, on the canal at Limehouse, in the presence of several experienced gentlemen in the construction and management of life-boats. The boat in question was designed by Mr. J. Peake, assistant master shipwright in her Majesty's dockyard, Woolwich, and was built by the Messrs. Forrest, for the National Institution for the Preservation of Life from Shipwreck, who purpose to place the boat at Ardrossan, on the coast of Scotland. Having been hove keel up, by means of an iron crane, the boat self-righted at once, and freed herself of the water she had thus necessarily shipped in thirty seconds. The rapidity with which the boat emptied herself of the water, by means of self-acting delivering valves, was perfectly astonishing. One moment she was full of water—the next hardly a drop remained on her platform. On a trial of the stability of the boat, she bore seventeen persons on her side, to bring the gunwale down, with the tubes shut to the water, and twelve men were required to bring it awash, with the valves open. It will thus be observed, that the self-righting power of the boat has hardly diminished her stability. The trials were in every respect satisfactory, and the boat possesses also much strength, and appears to be well adapted for the important services which she will soon probably have to perform. The boat is 27 feet long, and costs, with her necessary gear, about £150. Many similar boats, we understand, have during the past year been placed by the Shipwreck Institution on various parts of the coast. Being somewhat different in appearance and construction to those with which our boatmen and fishermen have hitherto been accustomed, it has been difficult in some places to reconcile them to the new life-boats. This prejudice is, however, speedily being removed, for the life-boats on the same plan stationed at Lyme Regis, Hauxley, Barmouth, and Aldborough, have, during the late awful gales, been eminently successful in saving the lives of a considerable number of shipwrecked persons, and their crews speak of their performances on those occasions in the highest terms of admiration. Nevertheless, it is lamentable to reflect that during the past month 700 poor fellows perished from shipwrecks on our coast—a fact loudly calling for every exertion to be put forth to lessen so frightful a sacrifice of human life.—*Morning Post.*

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Dr. A. W. Hofmann, "On Organic Chemistry."
British Architects, 8.—Renewed discussion "On the French and other methods of constructing iron floors."
Chemical, 8.
Statistical, 8.—Mr. Samuel Paull, "On Agricultural Statistics."

TUES. Horticultural, 2.
Royal Inst., 3.—Prof. Tyndall, "On Heat."
Civil Engineers, 8.—1. Discussion on Mr. Hobbs's Paper "On the Principles and Construction of Locks;" 2. Mr. Laforest, "Description of Martin's Improved Jacquard Machine."
Linnean, 8.
Pathological, 8.

WED. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Roy. Soc. Literature, 4½.
Society of Arts, 8.—Dr. John Stenhouse, F.R.S., "On the Deodorizing and Disinfecting Properties of Charcoal, with the Description of a Charcoal Respirator, for Purifying the Air by Filtration."
Geological, 8.—1. Mr. W. J. Hamilton "On the Tertiary Formations of the Mayence Basin;" 2. Mr. G. Selwyn "On the Gold-bearing District of the Neighbourhood of Mount Alexander, Victoria Australia."
Archeological Assoc., 8½.—Mr. H. Syer Cumming, "On Stone Implements."

THURS. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
London Inst., 7.—Prof. Tyndall, "On Magnetism and Electricity."
Numismatic, 7.
Antiquaries, 8.
Royal, 8½.

FRI. Architectural Assoc., 8.—Class of Design.
Philological, 8.
Royal Inst., 8½.—Dr. H. Bence Jones, "On the Acidity, Sweetness, and Strength of different Wines."

SAT. London Inst., 2.—Mr. E. W. Brayley, jun., "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-Metallic Elements."
Royal Botanic, 3¾.
Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 31st January and 1st February.

SESSION 1852-3.

Par. No.
687. Mercantile Steam Navy—Return.
897. (1) Indian Territories—Supplemental Appendix to Reports.
908. (1) Religious Instruction in Prisons—Return.
999. Revenue Survey (India)—Return.
1000. Colonial Expenditure—Return.

Delivered on 2nd February.

Turkey—Correspondence—Parts 1 and 2.
Rome (International Treatment of Vessels, &c.)—Declarations.

Delivered on 3rd February.

1. Public Income and Expenditure (Balance Sheet)—Account.
Colonial Possessions—Reports.
Barnstaple—Report of Commissioners.
Hamburgh (International Copyright)—Convention.
Republic of Paraguay—Treaty of Friendship, Commerce, &c.

SESSION 1852-3.

929. Revenue and Expenditure (Colonies)—Return.

Delivered on 4th and 6th February.

3. Post Office—Return.
2. Mint—Account.
19. General Committee of Elections—Mr. Speaker's Warrant.
4. Bill—Assessed Taxes Act Amendment.
Kingston upon Hull—Report of Commissioners—Parts 1 and 2.

SESSION 1852-3.

1010. Railway Accidents—Return.

Delivered on 7th February.

12. Head Money (Borneo)—Supplemental Return.
5. Bill—Episcopal and Capitular Estates.

Delivered on 8th February.

13. Wheat, Barley, &c.—Return.
18. Poor Relief (Ireland)—Summary of Returns.
Turnpike Trusts (England and Wales)—General Report.
Portugal—The Penal Code.
Revenue, Population, Commerce, &c.—Tables—Part 21.

Delivered on 9th February, 1844.

Queen's University in Ireland—Report.

SESSION 1852-3.

674. (1) Criminal and Destitute Children—Index to Report.

Delivered on 10th February, 1854.

3. Bills—Valuation of Lands (Scotland).
4. Bills—Oaths.
7. Bills—Coasting Trade.

Delivered on 11th and 13th February, 1854.
10. Bullion, &c.—Return.
14. Election Expenses (Scotland)—Return.
17. Naval Receipt and Expenditure—Account.
26. Court of Session (Scotland)—Return.
28. Education (Pupil Teachers)—Return.
35. Mint—Account.
11. Coals and Coke—Account.
24. Population and Poor's Rates (Scotland)—Return.
27. Oxford and Cambridge Universities—Copies of Letters.
33. Friendly Societies (Ireland)—Registrar's Report, &c.
40. Exchequer Bills—Account.
Turkey—Correspondence—Part 3.

Delivered on 14th February, 1854.
5. Bank of England—Annual Accounts.
7. Admiralty—Return.
8. Seamen's Wages—Abstract of Return.
16. Iron, &c.—Accounts.
31. Ecclesiastical Commission (Ireland)—Report.
32. Hops—Accounts.
5. Bills—Medical Practitioners.
6. Bills—Fisheries (Ireland).
11. Bills—Settlement and Removal.

Delivered on 15th February, 1854.
44. Local Acts—Reports of the Admiralty.
10. Bills—Devonport and Keyham Tunnel.
14. Bills—Church Building Acts Amendment.
Turnpike Trusts in Scotland (Income and Expenditure)—Abstract of the General Statements.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, 10*th February*, 1854.]

Dated 25th January, 1854.
185. E. B. Walmsley, Middle Hall, Hammersmith—Lighting, heating, and cooking.
189. R. A. Brooman, 166, Fleet street—Fluid for illuminating purposes. (A communication.)
191. J. Anderson, Auchnagie, N.B.—Motive power.

Dated 26th January, 1854.
193. T. Wicksteed, Leicester—Sewage manure.
195. F. M. Blyth, Norwich—Heating water for steam boilers.
197. S. Smith, Nottingham—Valves, &c., for passage, &c., of liquids.
199. G. Firmin, Bath—Anchors.

Dated 27th January, 1854.
200. F. F. Robart, Sotteville les Rouen—Clarifying liquids.
201. P. M. Crane, 18, Canonbury Villas—Iron.
202. A. C. de Simencourt, Paris—Composing and distributing type.
203. W. Church and S. A. Goddard, Birmingham—Ordnance.
204. H. Fendall, Hoxton, and W. St. C. Trotter, London—Crushing, &c., ores.
205. T. Thurlby, Guildford street East, Spa fields—Communication between points of railway trains.
206. W. Palmer, Brighton—Materials for, and construction of, buildings.
207. W. Partington, Bolton le Moors—Safety valve.
208. J. Atkinson, Richmond grove—Thrashing machinery.

Dated 28th January, 1854.
210. J. Grist, New North road—Break for carriages.
212. J. L. Clark, 2, Chester villas, Canonbury park—Conveying letters by pressure of air and vacuum.
214. D. Chadwick, Salford, and G. Hanson, Manchester—Meters.
216. W. G. Taylor, Norfolk terrace, Westbourne grove—Spinning machines.
218. W. and T. Redgrave, 23, Bow street—Railway signal lights.

Dated 30th January, 1854.
220. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Railway accidents. (A communication.)
222. W. Phillips, Birmingham—Coffins.
224. Earl of Aldborough, Stratford lodge, Wicklow—Aerial navigation.
226. R. Garrett, Leiston works, Saxmundham—Thrashing machines.
228. J. H. Johnson, 47, Lincoln's inn fields—Gas. (A communication.)

Dated 31st January, 1854.
230. T. Cox, Wolverhampton—Buttons.
232. E. W. K. Turner, 31, Praed street—Treating ores.
234. L. Young, 8, Bow lane, and E. Marten, 19, Louisa street, Stepney—Gas regulators.
236. J. Hazlehurst, Ulverstone—Iron and blast furnaces.
238. L. C. Koeffler, Rochdale—Preparing, &c., yarns.
240. W. Wright and G. Brown, Newcastle upon Tyne—Cupolas.
242. W. Malam—Blackfriars road—Gas.
244. P. Beaudot, 29, Boulevart St. Martin, Paris—Gas burners.

Dated 1st February, 1854.
246. C. B. A. Chenot, 29, Boulevart St. Martin, Paris—Combustion of gases.
248. A. Mortera, Paris—Stopping locomotives, &c.
250. J. Burgum, Birmingham—Damper.
254. C. F. Le Page, Paris—Lighting.
256. A. Daniel, Moorfields, Wolverhampton—Locks.
258. J. D. Morrison, Sunderland—Winches.

Dated 2nd February, 1854.
260. T. Atkins, Oxford—Motion to agricultural implements, &c.
264. J. Stevens, Southwark Bridge road—Railway signals.
266. F. H. Sykes, Cork street—Feeding boilers.

APPLICATIONS WITH COMPLETE SPECIFICATIONS FILED.
252. F. H. Wenham, Effra Vale lodge, Brixton—Fire-arms. 1st February, 1854.
286. R. J. Maryon. 37, York road, Lambeth—Windlasses. 6th February, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed February 10th, 1854.
1860. Jean Pierre Albert Galibert, of Paris—Improved domestic telegraph.
1889. Thomas Allan, of Adelphi terrace—Improvements in electric conductors, and in the means of insulating electric conductors.
1931. David Harkes, of Mere, Cheshire—Improvements in machinery or apparatus for mowing, reaping, or other similar purposes.
1977. William Austin, of 27, Holywell street, Westminster—Improvements in the manufacture of blocks of plastic materials for building purposes.

Sealed February 11th, 1854.
1867. Joseph Bacon Finnemore, of Easy row, Birmingham, and Edwin Daniel Chattaway, of Camden street, Birmingham—Improvements in apparatus for ascertaining or registering the number of persons travelling by omnibuses or other vehicles, or who may have entered in or passed by, out of, or through any particular place, vehicles, or building, during any given period.
1878. Samuel Adams, of West Bromwich—Improved apparatus for regulating the supply of water to steam and other boilers, applicable also to regulating the supply of liquids to vessels and reservoirs in general.
1880. James Strong, of Smethwick—Improvements in furnaces for smelting iron stones and ores.
1881. Thomas Turner and John Field Swinburn, both of Birmingham—Improvements in sights for rifles.
1887. Richard Archibald Brooman, of 166, Fleet street—Method of producing castings in malleable iron.
1888. William Littell Tizard, of Aldgate—Combinations of materials suitable for buildings and other structures, and parts thereof and machinery for producing the same.

Sealed February 13th, 1854.
1895. Frederick Lipscombe, of 233, Strand—Improvements in evaporating.
1900. John Gwynne, of Essex wharf, Strand—Improvements in the preparation of a black powder from coal, and in the applications thereof to the manufacture of paints, blacking, and various other purposes.
1902. John Gwynne, and James Egleson Anderson Gwynne, both of Essex wharf, Strand—Improvements in the preparation of beet root for the manufacture of sugar; which improvements are also applicable to the preparation of other vegetables.
1906. Hesketh Hughes, of Cottage place—Improved method of producing cut and fancy patterns in velvets, silks, and other textile fabrics.
2037. Thomas Walker, of Birmingham—Improvements in rotary engines to be worked by steam or other fluid.
2202. James Grafton Jones, of Islington—Improvements in the means of conveying signals or intelligence from one part of a railway train to another.
2514. George Hamilton, of Paisley—Improvements in spreading or distributing starch, gum, and other semifluid matters.
2726. James Dilks, of Parliament street, Nottingham—Improvements in bands for binding more effectually than heretofore packets or parcels of lace and other articles.
2825. Thomas Storey, of the Phœnix Foundry, Lancaster—Improvements in the construction and arrangement of apparatus employed in connection with sewers.
2848. Benjamin Solomons, of Albemarle street, Piccadilly—Improvements in telescopes and other glasses in their application to the measurement of distance.
2906. Samuel Messenger, of Birmingham—Improvement or improvements in railway, ship, and carriage lamps.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854. Feb. 13	3563	The Paragon Four-hole Button	William Aston	Princip street Works, Birmingham.

Journal of the Society of Arts.

FRIDAY, FEBRUARY 24, 1854.

TWELFTH ORDINARY MEETING.

WEDNESDAY, FEBRUARY 22, 1854.

The Twelfth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 22nd instant, the Rev. Dr. BOOTH, F.R.S., in the chair.

The following candidates were balloted for and duly elected:—

Bigelow, Erastus Brigham	Fry, Samuel James
Caplin, Dr. J.	Gilbee, W. A.
Fontaine Moreau, Peter Armand L. de	Ramsbottom, John
	Smith, John

The following Institutions have been taken into Union since the last announcement:—

344. Limerick, Institution.
345. Launceston, Mechanics' Institution.
346. Liverpool, Chamber of Commerce.

The views of the Council in regard to the admission into Union of Chambers of Commerce, were fully stated in No. 65, page 236.

Messrs. Rowney exhibited the following specimens of Chromo-Lithography, just published by their house:—"Cochem on the Moselle," and "City of Como," both after T. M. Richardson; "Frankfort," after William Callow; and "The Village Anglers," by W. Muller, all of which had been printed by Messrs. Rowney, with the exception of the last specimen, which was the production of the Messrs. Hanhart.

The paper read was

ON THE DEODORISING AND DISINFECTING PROPERTIES OF CHARCOAL, WITH THE DESCRIPTION OF A CHARCOAL RESPIRATOR FOR PURIFYING THE AIR BY FILTRATION.

BY JOHN STENHOUSE, LL.D., F.R.S.

The powerful effects of freshly-burned wood charcoal, especially when coarsely powdered, in absorbing gases and vapours, have been long known. Hence the limited extent to which charcoal has been occasionally employed to sweeten fetid water, and animal substances in the incipient stages of putrefaction. Sufficient attention has not, I think, however, been hitherto bestowed on a second and still more important effect which charcoal exerts upon those complex products of decomposition, viz., that of rapidly oxidising them, and resolving them into the simplest combinations they are capable of forming.

When coals or wood are burned with an inadequate supply of air, a variable amount of intermediate or secondary products is generated, constituting what are called soot and smoke; when, on the other hand, the combustion of the fuel is conducted with an adequate supply of oxygen and a sufficiently high temperature, carbonic acid, water, ammonia, with perhaps a little nitric acid, are almost the sole products.

The putrefaction of animal and vegetable substances is likewise, in general, a process of imperfect oxidation. Hence, under ordinary circumstances, when this is the case, a variety of more or less complex secondary products is formed, which usually possess very disagreeable odours, and exert exceedingly injurious effects upon the animal economy. To these substances the general name of *miasmata* has been given. Not much is known of their nature, but they are believed to be heavy, complex, nitrogenated vapours, which are decomposed by oxygen, chlorine, sulphurous acid, nitric acid, and other disinfecting agents.

My attention was particularly drawn to the importance of charcoal as a disinfecting agent by my friend, John Turnbull, Esq., of Glasgow, the well-known extensive chemical manufacturer. Mr. Turnbull, about nine months ago, placed the bodies of two dogs in a wooden box, on a layer of charcoal powder, of a few inches in depth, and covered them over with a quantity of the same material. Though the box was quite open, and kept in his laboratory, no effluvia was ever perceptible, and on examining the bodies of the animals at the end of six months, scarcely anything remained of them except their bones. Mr. Turnbull sent me a portion of the charcoal powder which had been most closely in contact with the bodies of the dogs. I submitted it for examination to one of my pupils, Mr. Turner, who found it contained comparatively little ammonia, not a trace of sulphuretted hydrogen, but very appreciable quantities of nitric and sulphuric acids, with acid phosphate of lime.

Mr. Turner subsequently, about three months ago, buried two rats, in about two inches of charcoal powder, and a few days afterwards the body of a full grown cat was similarly treated. Though the bodies of these animals are now in a highly putrid state, not the slightest odour is perceptible in the laboratory.

[The tubs containing the animals, covered with about an an inch of charcoal, were then shown to the meeting, but not a trace of unpleasant smell was perceptible.]

From this short statement of facts, the utility of charcoal-powder, as a means of preventing noxious effluvia from church-yards and from dead bodies in other situations, such as on board-ship, is sufficiently evident. Covering a church-yard to the depth of from two to three inches with coarsely powdered charcoal, would effectually prevent any putrid exhalations ever finding their way into the atmosphere. Charcoal-powder also greatly favours the rapid decomposition of the dead bodies with which it is in contact, so that in the course of six or eight months little is left except the bones.

In all the modern systems of chemistry, such, for instance, as the last edition of "Turner's Elements," charcoal is described as possessing antiseptic properties, while the very reverse is the fact. Common salt, nitre, corrosive sublimate, arsenious acid, alcohol, camphor, creasote, and most essential oils, are certainly antiseptic substances, and, therefore, retard the decay of animal and vegetable matters. Charcoal, on the contrary, as we have just seen, greatly facilitates the oxidisation—and, consequently, the decomposition—of any organic substances with which it is in contact. It is, therefore, the very opposite of an antiseptic.

The object of the present paper, however, is chiefly an application of the absorbent and oxidising properties of charcoal, which, so far as I am aware, has never yet been proposed; viz., to employ a new species of respirator filled with powdered animal charcoal, to absorb and destroy any miasmata or infectious particles present in the air in the case of fever, and cholera hospitals, and of districts infected by ague, yellow-fever, and similar diseases. I have got such a respirator made by Ferguson and Sons, Smithfield, instrument makers to St. Bartholomew's Hospital. It fits closely to the lower portion of the face, extending from the chin to within half an inch of the eyes, and projects about an inch on either side of the mouth. It therefore includes the nostrils as well as the mouth. The frame of the respirator is made of thin sheet copper, but the edges are formed of lead, and are padded and lined with velvet, so that it can be easily made to fit tightly to the face. The powdered charcoal is kept in its place by means of two sheets of fine wire gauze, from a quarter to an eighth of an inch apart. A

the body of the apparatus is metallic it has been electro-plated with silver. Electro-plating the respirator with platinum, or gold would certainly be an improvement. There is a small opening closed with a wire gauze screw, by means of which the respirator can be filled with charcoal or emptied at pleasure. The respirator is kept in its place by an elastic band passing round the back part of the head. I have employed *animal* charcoal as the more porous substance, but I should think wood charcoal would answer perfectly well. The object in view is, by filtering the air through such a porous substance as animal charcoal, to intercept the miasmata which may have got mixed with it. These I think cannot fail to be absorbed by the pores of the charcoal, where they will be rapidly oxidated and destroyed by the condensed oxygen with which they will be brought into the most intimate contact. The probability of this expectation being realised is greatly strengthened by the results of repeated trials with the respirator on certain noxious and offensive gases, such as ammonia, sulphuretted hydrogen, hydrosulphate of ammonia, and chlorine. I have found that air strongly impregnated with these gases, and which could not be respired for any length of time, under ordinary circumstances, may be breathed with impunity when the charcoal respirator is worn, the odour of these gases being rendered almost, if not altogether imperceptible. Any other highly porous substance, such for instance, as sponge platinum, or pounded pumice-stone, might probably be found to answer perfectly well for filling the respirator, but I have selected charcoal as the cheapest, and most easily available material.

While the filtration of water through charcoal powder and other porous substances has been advantageously practised for many centuries, the object in view being to deprive the water of numerous impurities diffused through it, which produce injurious effects on the animal economy, it is certainly somewhat remarkable that the very obvious application of a similar proceeding to the lighter fluid in which we live, viz., air, which not unfrequently contains even more noxious impurities floating in it than are usually present in water, should have, up to the present time, been so unaccountably overlooked.

In addition to the precaution of wearing such a respirator as that just described, persons necessitated to live in especially pestiferous districts might have their houses made as air-tight as possible, with the exception of such openings as are necessary to maintain a proper amount of ventilation. By means of these openings the air could be freely admitted through gauze into which the requisite quantity of charcoal had been quilted. The doors of such houses could also be made double, and be constructed of coarse cloth, likewise containing a thin layer of charcoal powder. As an additional precaution, if it were thought desirable, the walls, floors, and ceilings of houses in very unhealthy districts, could be easily lined with mattrasses filled with a couple of inches of charcoal powder. Were these and similar precautions adopted, I confidently anticipate that Europeans will be enabled to reside with comparative impunity in some of the hitherto most pestilential districts of the world.

[It should be stated that the Secretary and others of the auditory practically tested the power of the respirator to absorb ammonia, chlorine, and hydrosulphate of ammonia, and that the results were perfectly satisfactory.]

DISCUSSION.

Mr. Morson did not think that Dr. Stenhouse had dwelt sufficiently on the importance of rendering grave-yards innocuous, by covering the ground with a thin layer of charcoal. That was a question which demanded the greatest consideration at the hands of men of science. Much inconvenience was experienced by many London parishes in the removal of the dead to distant burial sites. This might be avoided by filling up the coffins with charcoal; by which a kind of low combustion, or burning of the dead, would be effected. In regard to the application of charcoal as a respirator, he believed that it might be safely employed, and was a question quite worth being taken up by the Board of Health, and the merits of the invention fully investigated.

Mr. G. F. Wilson wished to ask two questions:—First was it necessary that the charcoal should be dry? and second. How long would the charcoal in the respirator be efficient?

Dr. Stenhouse said that it was not at all necessary that the charcoal should be perfectly dry, although the more freshly made the better. The charcoal covering the animals in the tubs on the table, had been in his laboratory three months, and some of it even six months, yet it was still perfectly efficient. When applied to a respirator he imagined that the charcoal would last for many weeks, and it could be easily replenished, by unscrewing the valve and refilling. The great use of the respirator would be for medical men, especially in tropical climates, where it was no uncommon thing for two-thirds of the medical men and nearly all the nurses to be carried off during the raging of yellow-fever in ships and hospitals. Persons passing through such pestilential districts as the delta of the Niger, which might be traversed in the course of two or three days, might be completely protected by the use of this respirator.

Mr. Dugald Campbell had examined the respirator of Dr. Stenhouse, and had found it very efficacious in destroying the noxious vapours arising from decomposing animal substances. He was sure that it was capable of adding greatly to the safety of all engaged in hospitals in tropical climates, where men were not unfrequently cut off in the prime of life in a few hours.

Mr. J. C. Nesbit did not know of a single instance in which it had been proved that a deodorizing agent was also a disinfecting one. No doubt sulphuretted hydrogen, and other such like bodies as create disease, might be got rid of in this way. But what was miasma? Would a deodorizing body destroy its effects, although it might destroy the smell? Common earthy matters would, equally with charcoal, absorb poisonous vapours. He had known instances in which night-soil had been completely deodorized, but he could not assert that the injurious malaria arising therefrom was thereby destroyed. There was one other point which he thought of sufficient medical importance to notice He alluded to the fact that the respirator would only cover the mouth and nostrils, leaving the whole of the skin, the pores of which were known to be large absorbents, quite unprotected; and who could say that miasma might not be introduced into the system through the pores of the skin.

Mr. Beard wished to know whether the respirator had been tried, and its effects ascertained in a smoky atmosphere, for if it could be used in cases of fire, it might be the means of saving many lives.

Mr. C. J. Varley thought that we should not refuse to avail ourselves of this discovery, even if it had been proved that a deodorizing agent was not necessarily a disinfecting one. We might thus refuse to take advantage of that which might be of real value, because it had not been shown that it had a twofold purpose.

Dr. Stenhouse said, that he had only recently brought out the respirator, and had not, therefore, put it to the test mentioned by Mr. Beard. It was well known that malaria was almost invariably confined to low situations, and appeared to consist of heavy complex vaporous substances. Thus while the low portions of Rome, for instance, were infected with malaria, especially during the summer months, the higher portions of the city were comparatively healthy. During the winter months the Pope lived in the Vatican, but during the summer he shifted his quarters to his other palace, on the summit of the Quirinal Hill. In warm climates, as was well known, the highest situations were almost invariably the most salubrious. Miasmata, therefore, consisting of heavy vaporous bodies would, in all probability, be more effectually ab-

sorbed and oxidated by powdered charcoal than such gases as ammonia, sulphuretted hydrogen, and chlorine.

The Secretary announced that there would be no meeting on Wednesday next, being Ash Wednesday.

INTRODUCTION OF SILKWORMS FROM ASSAM INTO MALTA AND ITALY.

Colonel Sir William Reid, Governor of Malta, has forwarded to the Society, through the Colonial office, a communication in which he states that, after many failures, through the very laudable and persevering efforts of Mr. Piddington, of Calcutta, with the aid of the directors of the Peninsular and Oriental Steam Packet Company, he has received some sound eggs of the Indian silkworm, the *Bombyx Cynthia*, called by the natives of Assam *Eria*, and which feeds on the leaves of the castor-oil plant. Of the eggs received about five hundred have hatched, and the worms, after having undergone two mutations, still appear to be in a very healthy state, feeding only on the castor-oil plant. Mr. Piddington had, for some time previous to Sir William Reid's arrival in Malta, been striving to convey this silkworm to the Agricultural Society of Turin, as they wish to introduce it into Italy; it will be his first duty, if he succeeds, to send it there. Sir William Reid has also enclosed some copies of an account of the Assam silkworms, published in the "Journal of the Asiatic Society of Bengal," a notice of which will be given in the next number of this Journal.

PAPER FROM SUGAR CANE REFUSE.

The following communication, addressed to His Grace the Duke of Newcastle, relative to the application of the refuse of the Sugar Cane to the manufacture of paper, having been laid before the Council, was by them referred to two members of the Society practically conversant with paper making, Mr. T. De la Rue and Mr. W. Stones, for their opinion. That of Mr. De la Rue is appended to Dr. Cumin's letter. Mr. W. Stones reports that he has nothing further to add to his former communication on this subject, published in No. 19 of the Journal, Vol. 1, page 225. His Grace the Duke of Newcastle has been solicited to procure for the Society one or two tons of the refuse, so that experiments may be made on a large scale, with a view of ascertaining whether this material can be profitably employed for the purpose suggested. Mr. T. De la Rue has kindly undertaken to superintend a series of experiments, and has likewise obtained promises from several eminent firms to make the necessary trials.

11, Cavendish-crescent, Bath,
Dec. 8th, 1853.

MY LORD DUKE,—I beg to lay before your Grace, specimens of paper made by me from the refuse of the sugar cane, of the raw material, and of the article in the first and second stages of its manufacture. The opinions expressed by paper manufacturers of this dried pulp and paper are very favourable; and as the cane refuse is used for fuel in our sugar colonies, and great quantities of it from the sugar plantations on the Mississippi are annually thrown into the river, there is reason to believe that the article could be imported into this country at a very low rate. The chief difficulty would arise from the bulkiness of the raw material; but if the canes were cut into short pieces by a machine, provided with a trough to save such juice as might be forced out, and the pieces then placed in the hydraulic press, a much greater amount of saccharine juice would be obtained than by the present process, and the refuse would be converted into solid blocks, fit, without any further operation, to be immediately exported.

I have, &c.
(Signed) W. CUMIN, M.D.

His Grace the Duke of Newcastle, &c., &c.

84, Westbourne Terrace,
February 11th, 1854.

SIR,—With reference to the application of the refuse of the sugar cane to the manufacture of paper, as suggested by Dr. Cumin, I beg to state that it is well known that most fibrous materials are capable of being converted into paper; but as the cost of preparing and bleaching is generally much greater than when rags, rope, cotton, and flax waste are used, few other fibrous materials have been hitherto profitably applied to the purpose of paper making.

I am, however, of opinion that, on account of the present scarcity of the materials used in paper making, and the increasing demand for paper, recourse must be had to other fibrous substances; and in this I am supported by many eminent paper makers whom I have consulted.

With respect to the waste sugar cane, I am of opinion that its woody fibre is peculiarly well adapted for the production of high class paper; but as the decomposition or removal of its cellular structure will entail considerable loss in weight, it becomes problematical whether it admits of being *profitably* used in paper making. I would suggest that the Society of Arts should obtain about half a ton or more of the waste of the sugar cane, to be placed in the hands of such persons as might feel disposed to try it, and I am willing to undertake the supervision of an experiment, and report thereon.

I am, your's truly,
THOMAS DE LA RUE.

Gallery of Inventors.

BIOGRAPHICAL NOTICE.

WILLIAM COOKWORTHY.

William Cookworthy was born at Kingsbridge, in 1705. His mother was left a widow, with, it is believed, five sons—William, Philip, Benjamin, Joseph, and Jacob—and some daughters. Whether before or after she lost her husband is not known, but nearly all their property was sunk in the South Sea Stock speculation, so that she was greatly reduced in circumstances, and obliged to send her sons out into the world early in life. William and Jacob went into the drug business, at Plymouth, about the same time. Their mother retired to a small house at Kingsbridge, opposite the entrance to Duncombe-street, and maintained herself and daughters in great respectability by dressmaking, and took apprentices to that business. She was obliged to live in a very humble, economical manner, sometimes allowing, it is said, only one pound of pork for dinner for the family. After a time their prospects began to mend; the sons, William and Jacob, got forward in business; and the mother went to live with them in Nut-street, Plymouth.

William Cookworthy was an active member of the Society of Friends, and for about 25 years he held a meeting

at his own house every Sunday evening, when at home and permitted by health—at first designed for his own family, but it was soon attended by most of the younger Quakers ni Plymouth. He appeais to have had considerable reputation as a preacher.

In 1745, an American brought him some specimens of China clay (Kaolin) and China stone (Petunze), found in Virginia, and of porcelain made from them. In a letter written by him to his friend, Mr. R. Hingston, dated Plymouth, 30th of fifth month, 1745, he says:—

"I had lately with me the person who has discovered the China earth. He had with him several samples of the China ware, which I think were equal to the Asiatic. It was found on the back of Virginia, where he was in quest of mines; and having read Du Halde, he discovered both the *Petunze* and *Kaolin*. It is this latter earth which he says is essential to the success of the manufacture. He is gone for a cargo of it, having bought from the Indians the whole country where it rises. They can import it for £13 per ton, and by that means afford their china as cheap as common stoneware: but they only intend to go about 30 per cent. under the company. The man is a Quaker by profession, but seems to be as thorough a Deist as I ever met with. He knows a good deal of mineral affairs, but not funditus."

At this time much curiosity existed on the subject of China clay and China stone, owing to Reaumur's report in 1729, on the materials of the Chinese porcelain sent home by Father d'Entrecolles, which had originated the manufacture of Sevres, and to the accidental discovery of the like process at Dresden. This hint from the Americans, no doubt, set him on the investigation. Polwhele, in his "History of Cornwall," says:—

"Among the burrows of a mine near Helstone the late ingenious Mr. Cookworthy discovered a sort of earth, which partly gave occasion to his porcelain manufactory at Plymouth.

"The substance had the distinguishing characters of the Kaolin of China, which is described to be a white, unctuous, unvitrifiable earth, and is considered by the Chinese as the bones of China ware, or what gives it its firmness and consistency in the fire. The Petunze, or vitriable ingredient (says Mr. Cookworthy), which the Chinese consider as the flesh, since it gives the body transparency, softness of texture, and lustre in the breaking, was yet to be discovered. In his search after this, Mr. C. found a stone which would vitrify, but, after some pretty extensive experiments, was satisfied it would not answer. This was a compound stone, having a small mixture of limestone particles in it.

"Some time after this he perceived that our western granite or moorstone was of the genus of the stone he was enquiring after, as it was sufficiently vitriable.

"On giving a piece of this stone a white heat, in a crucible, it melted, and the white parts of the stone were of a beautiful, glassy, semi-diaphanous white; but the black particles burning red, as containing iron, and being by any practicable art inseparable from the white part, it was plain that the common moorstone would not answer in so elegant a ware as the porcelain, where the perfection of the white is its merit and excellence. At length he discovered what he wanted near St. Austell."

The precise date at which he made the discovery does not appear to be known, but in *Borlase* it is said, that "in 1758 Mr. Cookworthy, of Plymouth, had made experiments on the Breage China stone, and that it had been found useful in the making of porcelain." Probably the discovery had taken place a few years before, and may be considered as having been made not far from 1755, but no distinct accounts of it appear, till he took out his patent on 17th March, 1768 (now 898 in the Commissioners' list.)

In the *History of the Staffordshire Potteries, Hanley*, 1827, compiled principally from the personal recollections of aged potters living at that period, we learn that "Mr. Cookworthy having discovered, in what are now called the Cornish clay and Growan stone, similar materials to the Kaolin and Petunze, he first attempted the manufacture of porcelain, and being tolerably successful he obtained a patent in 1768, for the exclusive use of these materials in the manufacture of porcelain and pottery. He afterwards sold the patent right to R. Champion, Esq., a respectable merchant in Bristol, who had been long employed in investigating the properties of porcelain." This gentleman erected a manufactory at Bristol, and succeeded in producing the first real English porcelain, rivalling the Oriental productions; but after expending a large fortune in the scheme, he was not successful in obtaining adequate returns for his outlay, and in 1777 he sold the patent to a company in Staffordshire.

Lord Camelford, on whose estate Cookworthy had made the discovery of the earths, in a letter dated Boconnoc, Nov. 30, 1790, writes thus:—

"Dear Sir,—With regard to the porcelain manufactory that was attempted to be established some years ago, and which was afterwards transferred to Bristol, where it failed, it was undertaken by Mr. Cookworthy, upon a friend (a) of his having discovered on an estate of mine in the parish of St. Stephen's, a certain white saponaceous clay, and close by it a species of granite or moorstone, white, with greenish spots, which he immediately perceived to be the two materials described by the missionary Père d'Entrecolles, as the constituent parts of Chinese porcelain, the one giving whiteness and body to the paste, the other vitrification and transparency. The difficulties found in proportioning properly these materials, so as to give exactly the necessary degree of vitrification, and no more, and other niceties with regard to the manipulation, discouraged us from proceeding in this concern; after we had procured a patent for the use of our materials, and expended on it between two and three thousand pounds, we then sold our interest to Mr. Champion, of Bristol."

It would seem from the words "we" and "us," in this letter, that Lord Camelford was his partner in the undertaking.

The works were established at Coxside, where the buildings still continue, as a shipwright's yard and offices, and many specimens are said to remain, showing the gradual progress made from time to time in the manufacture; from fire cracks, warping, bad colour, glaze in blotches from imperfect fusion, and painting run and tarnished, up to the purest white in body and glaze, the most delicate and exquisite painting, and the enamelling and projecting shells, leaves, and flowers, free from distortion on their thinnest edges. As to any detailed accounts of the progressive condition of the works, not only do there appear to be no written documents, but even tradition is silent. They are said to have obtained an excellent painter and enameller from Sèvres, and Bone, the distinguished British enameller, is known to have served his apprenticeship there. In Burt's "Review, &c., of Plymouth, 1816 (p. 174), it is said on the authority of "one employed on the China works in his youthful days," that there was such a demand for their enamelled blue and white China, both at home and in America, both ornamental and useful, that they could hardly be made fast enough, that from 50 to 60 persons were engaged in its various processes, and that the fire consumed was chiefly wood.

So important was the discovery considered that when Mr. Champion petitioned Parliament for an extension of the term of his patent, the manufacturers of cream colour or Queen's ware, among whom were Wedgewood and Turner (neither of whom at that time had made any

(a) This expression, no doubt, refers to the American mentioned in Cookworthy's letter, and is a misapprehension of the American discovery. All accounts, written or traditionary, attribute the discovery in Cornwall to W. Cookworthy, and from what is known of him he was not one likely to accept the reputation due to another.

porcelain), objected to its extension on the ground of its restraining others from employing Cornish stone in other branches of the manufacture where it would be of great advantage. They opposed the bill, and, with the aid of Earl Gower, it was so modified that while it confirmed to Mr. Champion the exclusive application of the Cornish clay and stone for transparent ware, whether called porcelain or otherwise, it permitted potters generally the free use of the stone in *opacous* glazes, and of the clay in *opaque* pottery, by which that ware was greatly improved in solidity, durability, and texture, and rendered greatly superior to any before manufactured.

The manufacture, however, necessarily followed the fuel, for it appears that the ware, before finishing, is many times submitted to the action of heat—that the production of every ton of it has consumed at least from eight to ten tons of fuel, and the product of clay and stone in 1852, exported from Cornwall and Devon, amounted to upwards of 100,000 tons, returning, it is said, something like £150,000 a year to the industry of the places whence it is sent, whilst about sixty years ago, the quantity then produced was about 100 tons a year, and that was considered more than the market would bear.

He is said, in his regular business of a chemist, to have improved several of the medicinal preparations of the day.

He did not, however, always confine himself to practical and intelligible science. He appears to have been a firm believer in the divining rod, and wrote a treatise on its virtues.

He was a disciple of Swedenborg, and appears to have been esteemed by the scientific men of his day. His grandson keeps as a relic the table round which Captain Cook, Sir Joseph Banks, and Dr. Solander sat with him just previous to their famous voyage round the world.

He died the 16th of October, 1780, aged 76 years, and so great was the estimation in which he was held by his fellow-townsmen, that his funeral was attended by large crowds. He is described by one still living "as a tall amiable man, with a three-cornered hat, and bushy curly wig; a mild but intellectual countenance, and full of conversation. My father and he used to walk home from meeting, busily talking all the way."

It is remarkable that nothing is said of the history of these substances in the Jury Reports of the Great Exhibition, and the subject is scarcely touched upon in the Exhibition Lectures, and in neither does Mr. Cookworthy's name once appear. A singular omission, when we consider how much the potteries are indebted to his discovery. Mr. H. M. Stokes, however, in his valuable essay on the China Stone and China Clays of Cornwall, awards to him the merit of having, in 1768, first insured attention to their useful properties.(a)

DUBLIN EXHIBITION.

The following is a copy of a resolution passed unanimously at the last meeting of the General Committee of the Great Industrial Exhibition of 1853:—

"Resolved—That the very grateful acknowledgments of the Committee of the Great Industrial Exhibition of 1853, held in Dublin, are justly due and hereby tendered to the Council of the Society of Arts, for their active co operation in promoting the objects of the Exhibition, and for the assistance rendered to the Committee in obtaining many valuable Indian and Chinese specimens of manufacture and art."

(a) Mr. John Prideaux, the great-nephew of Cookworthy, has, with laudable zeal and industry, endeavoured to collect and preserve what is known by tradition or otherwise of him; and much of the foregoing notice is given on Mr. Prideaux's authority.

ART OF MARBLING(a).

Mr. Woolnough states in the preface to this little practical treatise, that he has been repeatedly solicited during the last few years to publish some work on this subject, but had hitherto refused to do so, because he considered that it might militate against the general interests of the trade. Finding, however, that the business is extending, and that work is being executed in an inferior style by persons not professed "marblers," he now comes forward with the result of twenty-five years' actual experience, stating his belief at the onset that the art is open to very great improvement, and that, could the light of chemistry, with its various agencies and combinations, be brought to bear upon it, there is no reason why this curious and simple art might not be materially advanced.

The art of marbling is believed to date from the beginning of the seventeenth century, and its discovery is attributed to the Dutch. Many years ago paper of the size of foolscap was exported to this country from Holland, stained in this manner; and in order to evade payment of the duty, some of it was wrapped round toys, and so passed free. The art is described to consist "in the production of certain patterns and effects, by means of colours so prepared as to float upon a preparation of mucilaginous liquid, possessing certain antagonistic properties to the colours prepared for the purpose, and which colours, when so prepared, floated, and formed into patterns upon the surface of the liquid, are taken off by laying thereon a piece or sheet of paper, or dipping therein the smoothly-cut edges of a book." The colours required are the same as those ordinarily used for painting, both in oil and distemper, but they must be procured in a dry state, as manufactured, either in lump or powder, and then ground with a preparation of beeswax, in the average proportion of one ounce of prepared beeswax to one pound of colour. When required for book-edges they should be ground on a slab with a "muller." Notices of the different colours and their uses follow; and next of the preparations or vehicles required for marbling upon, viz., gum tragacanth, or gum dragon, linseed, carrageen or Irish moss, flea seed, and ox gall. For Spanish, French, Italian, West End, and British patterns, a mixture of gum tragacanth and the mucilage of flea seed, in the proportion of one quart of the latter to two gallons of the former is required. For Dutch, nonpareil, curls, antiques, and all patterns which require to be formed with any kind of instrument on the preparation in the trough, the pure solution of gum tragacanth alone is recommended. Indeed all the patterns might be produced on this gum, although some are improved by the addition of the mucilage of flea-seed, which is far stronger than that obtained from linseed, and will preserve its strength for several days without turning to water. Copious descriptions of the various processes for producing the patterns upon paper are then given, from which the method adopted in preparing French or shell patterns may be selected as an illustration.

A trough having been filled to within half an inch or three quarters of an inch of the top, with the solution of gum tragacanth and flea seed, the colours are arranged on the right hand, and the paper or books to be marbled on the left. Large brown French, or shell pattern, has three veins—red, yellow, and black. Ox gall and soft water are mixed together, in the proportion of one-eighth of the former to seven-eighths of the latter, the vein-colours being added gradually, and gently stirred with a brush, until the proper consistence is attained. This may be ascertained by sprinkling a little colour on the solution in the trough; if it sinks, and does not spread out, a little neat gall must be added, but should it open too much, more colour is required. The brown requires more gall, less water, and should be

(a) "The Art of Marbling, as applied to Book-edges and Paper, &c.; with a brief Notice of its recent Application to Textile Fabrics, &c. Illustrated by Specimens. By J. B. Woolnough. London. 1853.

thicker than the vein colours. A few drops of the very best olive oil must be added, which will cause the colour to form itself into rings or shells, when sprinkled on the surface of the solution in the trough; and it should force the other colours into the form of veins. The surface of the solution being lightly skimmed, the colours must be immediately and equally sprinkled on, beginning with the red; next, yellow; thirdly, black; and lastly, the principal or body colour. The paper is then taken up by the two opposite corners, and brought down gradually on the surface, so as to avoid air-bladders. In order to take the paper out, a lath or thin stick, sufficiently long to rest upon the edges of the trough, is laid across the centre of the paper. One side is then laid back over the stick, and the paper is taken out of the trough by the stick, and placed on a rack to dry.

In the year 1851, a patent was taken out for the application of this art to woven and textile fabrics; and now many dyed and plain cloths, used for bookbinding, are ornamented in this manner. By the addition of a little varnish, the brilliancy of the pattern may be preserved.

ICE-MAKING MACHINE.

An American invention, for which a patent has been taken out in this country, is now at work in the Commercial-road. The principle on which the machine acts has been long known, viz., that air when compressed gives out its heat, and in expanding absorbs it, rendering it latent. In the machine air is compressed by a powerful pump, and the heat it gives off during compression is taken up by jets of water. This air then passes into a receiver, where it is separated from the water, and from the receiver enters a cylinder provided with a piston, in which it expands gradually. The expansion force is utilised by the agency of the piston, whose rod is connected with that of the compressing pump in such a manner, that the dilation of one portion of the air aids in compressing another portion just entering the machine. As the air expands it cools, or, to speak more accurately, it abstracts caloric from a supply of liquid, congealable only at a low temperature, such as brine, spirits, &c., which surrounds the dilation cylinder, and also enters the same in a jet, and finally escapes into the outer air. The fluid thus cooled circulates in a tank round the vessels containing the water to be frozen; extracts the heat therefrom, returning again to be cooled in the expanding cylinders. That ice may be thus produced, and in considerable quantities, admits of no doubt—the question to be solved is the cost of production; and this resolves itself into wear and tear of machinery, and consumption of fuel to drive it. The machine which has been erected in the Commercial-road does not appear to have been constructed with due regard to economical arrangement of the pipes and cylinders—these would admit of great improvement—and, besides, great loss takes place in the transmission of the power from the steam-engine employed to drive the machine. Still, notwithstanding these disadvantages, it is said that the experiments show that large quantities of ice may be made at a comparatively low cost.

ELEMENTARY DRAWING.

From a Supplementary Minute by the Lords of the Committee of the Privy Council on Education, it appears that an exercise in drawing will in future form part of each examination of the students; that their lordships will seek the assistance of the Department of Science and Art in settling and testing this exercise; and that in determining certificates, considerable weight will be attached to proficiency in this art. In a letter addressed to the Department, the Committee of Council on Education say that they look to the training schools as the points at which their wishes as to instruction in drawing may be the more effectually accomplished. With the view of carrying out their intentions, the following regulations have been mutually agreed upon:—

1. Pupil Teachers will be admitted to study and practice at any Schools in connexion with the Department of Science and Art at a cost to themselves of only half the ordinary Fees payable for Instruction.

2. Upon producing the receipts for the payment of the Fees, and specimens of their Drawings, to H. M. Inspector, when he inspects the School to which such Pupil Teachers are attached, they will have an opportunity afforded them (as part of each annual examination) to exhibit their proficiency by the performance of an Exercise in Drawing.

3. The exercises thus performed will be forwarded by H. M. Inspectors of Schools, with the rest of the papers, to the Council Office, whence they will be transmitted to the Department of Science and Art, and, if passed as satisfactory, the person executing them will receive (without charge) from the same Department certain prizes.

4. Students at Training Schools, and Candidates for Certificates of Merit, will be examined annually, at the usual period, viz., Christmas.

5. The Committee of Council on Education will place a value on these Certificates of Competency. Every Teacher who obtains a full second year's Certificate for Drawing will be allowed to receive an addition of £1 a year to his annual allowance from the Committee of Council on Education for every Pupil Teacher (up to a maximum of £3) who is instructed by him in Drawing, and who satisfies the Department of Science and Art with his annual progress according to the foregoing provision.

BEET ROOT SUGAR.

The quantity of beet-root used in the Zollverein States of Germany in the manufacture of sugar, was as under:—

For the commercial year	1849-50,	. 11,525,678	centners,
„ „	1850-51,	. 16,000,000	„
„ „	1851-52,	. 20,000,000	„

ROYAL COMMISSION FOR THE EXHIBITION OF 1851.

His Royal Highness Prince Albert presided on Tuesday afternoon last, at a meeting of the Royal Commission for the Exhibition of 1851. His Royal Highness arrived at the New Palace of Westminster at three o'clock, attended by Colonel Wylde. The other commissioners present were:—Lord Overstone, the Right Hon. Henry Labouchere, the Right Hon. Edward Cardwell, the Right Hon. B. Disraeli, Sir Alexander Spearman, Sir William Cubitt, Sir Charles L. Eastlake, Mr. T. Baring, M.P., Mr. Coulson, Q.C., Mr. C. W. Dilke, Mr. T. F. Gibson, Mr. John Gott, Professor Forbes, and Mr. P. Pusey. Mr. Edgar A. Bowring, secretary to the commission, attended.

His Royal Highness had previously presided at a meeting of a Committee of the Royal Commission, which was attended by Lord Overstone, the Right Hon. E. Cardwell, the Right Hon. B. Disraeli, Sir A. Spearman, Sir W. Cubitt, Mr. Baring, M.P., Mr. Coulson, and Mr. Edgar A. Bowring (secretary). The meeting broke up at six o'clock.

ROYAL COMMISSION, 1851.—It is understood that a most interesting series of block plans has been submitted to H. M. Commissioners by Professor Cockerell R.A., showing that there is ample space on the Kensington estate to erect any, even the most extensive public buildings for which foreign capitals have become so famous, including the Louvre and Tuilleries combined, the Vatican, the Baths of Caracalla, the Escurial at Madrid, the Glyptothek and Pinacothek of Munich, &c. This shows, at all events, the Commissioners have, in some degree, redeemed their pledge expressed in their second Report to the Crown, of finding space for our national Institutions, if not in the heart at least within reach of our gigantic metropolis.

LOCKMAKING AND LOCKPICKING.

At the Institution of Civil Engineers, on Tuesday week, a paper was read "On the principle and Construction of Locks," by Mr. A. C. Hobbs, Assoc. Inst. C.E. The paper commenced by asserting, as an axiom, that the highest point of security to be attained in the construction of locks, must consist in the fact, that the possibility of picking, or opening them, without their true keys, should depend entirely on chance; and that, notwithstanding the immense variety of locks already invented, there were really but three absolutely distinct principles involved in their construction,—so classed without reference to dates and for convenience of description. The first principle included all locks having a series of fixed obstructions, or wards, in and about the key-hole, to prevent any instrument, except the key, being turned in the lock; this principle was shown to be inefficient, however complicated the construction might be, as the wards themselves afforded the means of ascertaining the form of key required to open the lock. The second principle was that of the Letter, or Puzzle Lock, which appeared to carry out the principle, or doctrine of chance, to the fullest possible extent. But in this case, also, a method was shown, by which the lock could be opened as easily as in the former; proving, that the inventor of that class of lock had failed to accomplish the object of producing a fastening, whose security was dependent only on mere chance. The third principle, or last class of locks, including all those possessing a series of moveable pieces called slides, pins, tumblers, etc., placed within the case of the lock, and which pieces must be operated upon and moved into certain given positions, by a key, before the bolt could be shot. This principle was illustrated by descriptions of the Egyptian lock, the Bramah lock, the inventions of Barron and of Bird, the Detector of Mitchell and Lawton, and the later improvements of Chubb and of Cotterill (of Birmingham) and others. Allusion was then made to the great reliance which, until recently, had been placed on these locks, and an explanation was given of the principle on which all locks of this description could be as easily picked as their predecessors.

The author then commented on the necessity of devising some simple and effective means, by which the defect, common to all the above locks, might be remedied, without adding materially to the cost. This desideratum he had endeavoured to secure, by the introduction of what was called, a moveable stump, which projection, instead of being rivetted into the bolt, was fixed to a piece, moving upon a centre, or pin, at the back of the bolt. The action of that piece was such as to render it impossible to ascertain the true position of the tumblers, for, on any pressure being applied to the lock, for that purpose, the stump, by its motion, locked the bolt, and left the tumblers at perfect liberty. The author stated his conviction, that this, apparently slight alteration, rendered it impossible to open such a lock, except by the mere chance, or accident, of a key fitting it; there being no possible means of ascertaining the form of key requisite to open it surreptitiously. Since the introduction of this lock, several attempts had been made to produce the same result, without actually copying the original, but with very little success. An additional principle of security, devised in America, was then pointed out, in the celebrated permutating bank lock, invented by Robert Newell, of the firm of Day and Newell (New York), of which invention Mr. Hobbs was the proprietor in this country. Previous to the introduction of that system, permutating keys had been used, but they required that the lock itself should be altered, to suit any new adjustment of the bits of the key, whereas, in the American lock, the key alone, being altered, produced by its own action the corresponding arrangement in the lock. By this ingenious contrivance the person using the lock became his own lock-maker, and was able to render the key useless to any other person by a simple change in the bits, after locking the door.

In respect to the locks alluded to in the paper, the author justified his statements by the two facts,—that he had not only elucidated the principles on which all such locks might be picked, but that he had actually performed all that had been described. Finally, a hope was expressed, that whatever had been done and said to enlighten the public as to the insecurity of many locks now in use, instead of causing any unpleasant personal feelings, would stimulate lock manufacturers to produce what was really required, viz., secure locks, adapted to all purposes, of good workmanship, and at a moderate price.

On Tuesday last the evening was devoted to the discussion of Mr. A. C. Hobbs' Paper, when a succinct description was given of the various recent modifications generally introduced by makers of locks, and it was argued, that most of them were simply alterations of form, without materially adding to the security. An exception might, perhaps, be made in favour of Mr. Denison's lock; which was so constructed, that the bolt was shot by turning a handle, without the intervention of a key, which in fact was only used, for placing the tumblers in a proper position, to allow the bolt to be withdrawn, or unlocked, by the handle,— the key hole being kept closed during the passage of the bolt; the key might, therefore, be always retained in the possession of one person, whilst the lock could be closed by any subordinate; this was important in banks and other similar establishments. The principal of the bolts being shot by a handle was not new, but the other arrangements were admitted to possess novelty. The principle of Mr. Cotterill's "patent climax detector lock" was then examined, and it was shown to be entirely based upon the Bramah lock, but was less secure in its arrangement, inasmuch as the form of the key admitted of so little variation in the depth of the grooves, for moving the slides, — that a lock, having six slides, might be opened by the end pressure of a piece of soft wood,—and that any lock, on that principle, with any number of slides, could be easily picked by the pressure system.

It was explained, that the American permutating lock, which had been so fully described in the paper, was not intended for ordinary domestic purposes, but for banks and establishments requiring extreme precautions for security, and that the chief object in the introduction of Hobbs' moveable stump, or protector lock, was to supply a secure lock at a moderate price. In the course of manufacturing, as might be naturally supposed, the weak points of this lock had not escaped detection, and it was soon discovered, that although the principle was correct, as long as the stump remained moveable, if, by any means, the stump could be held fast, the lock became one of the ordinary tumbler locks, and was as easily picked as the others. For instance, in a till, or drawer lock, where the key-hole was parallel to the bolt, it was easy, by the insertion of a piece of watch spring beneath the lock, to catch and hold the stump, and to open the lock. This, however, was readily prevented by the insertion of a tongue in the back plate, fitting into a corresponding groove in the back of the bolt, thus cutting off all access to the moveable piece under the bolt; and further, to preclude access to the stump itself, a piece of steel was rivetted into the front plate, reaching through the tumblers into a groove in the bolt, thus placing an effectual barrier between the key-hole and the stump. With these slight additions, which were now introduced, it was contended, that locks constructed on the principle of the moveable stump might be considered secure. It was shewn, that Mr. Goater, who was connected with the establishment of Mr. Chubb, had succeeded very ingeniously, in picking three of Hobbs' till locks, by the means which had been described, those locks, however, not having the additions for security which had been alluded to. This opening of these locks was admitted to be perfectly legitimate, showing slight defects in the details of construction; but

demonstrating the correctness of the principle, and it was argued, that it was only by such means that the manufacture of locks could be tested and improved.

Home Correspondence.

ON SOME OF THE LATE DISCUSSIONS AT THE SOCIETY OF ARTS. (a)

SIR,—It seems to me, that if the Council of the Society of Arts does not take care, the discussions which they invite will very soon be brought into the same happy state of public reputation as the prizes which they give, and without the same excuse; since they may say, and without any fear of contradiction, after what we heard the other night about "preliminary examination," that no system for awarding either patents or prizes for new inventions by examination can possibly be anything but fallacious and unsatisfactory.

A fortnight ago they got up, with the best intentions, a discussion, or a "Conference," on "strikes" Whether it did any good, or could have done any, however it was conducted, are matters on which there may be a difference of opinion. There is no difference as to the fact, that what was acknowledged by those who came there to be the most important of the "four points" into which the Council took upon themselves to divide the subject for the disputants, and to put the last of all, was thereby obliged to be left undiscussed altogether. One would have thought such a result as this would open the eyes of any men who were not too wise to be taught by experience (which the proverb declares not to be made for wise men, but for fools) to the absurdity of interfering with the freedom of any discussion which they invite, either under the pretence of shortening it, or regulating it, or getting the greatest number of opinions in the shortest time, or any other pretence whatever. Your Council seems to think that the proper translation of *quot homines tot sententiæ* is—the more men you can get to speak in a given time, the more good speeches you will hear; whereas, it is certain to be just the reverse. Of the men who are really worth listening to in any debate, two or three will say more that is worth hearing in two hours, than twenty or thirty such men as will condescend to speak by the minute-glass in twice the time. The men who are worth hearing know what is best worth saying on their side of any question, and how to say it, a great deal better than you, or I, or any Council on earth can tell them; and they will not come and perform an oratorical "hornpipe in fetters" for your amusement; and a discussion conducted in that way inevitably degenerates into a sort of pop-gun fire of opinions, which nobody cares about, and unsupported by any arguments worth going ten yards out of your way to hear.

The Council, however, learnt no such lesson from the proceedings of their Conference; for not until they had tried it once more, and had distinct complaints made by speakers and intended speakers, that it was impossible to discuss anything properly in speeches limited by minutes, did they give up that kind of interference; and even then they retained another even more absurd and unjustifiable. For I do not mean to say that any limitation of the length of speeches is unreasonable; and a limitation of the length of written speeches, or lectures, (not even excluding sermons), I think extremely desirable. Nobody ever gets attention to the reading of anything much beyond half an hour; and it must be a very good speech which can be extended to an hour (on any single subject) with any advantage to the speaker's cause. But nothing can justify the absurdity, one may almost say, the indecency, of any body of men propounding a subject for discussion, and at the same time assuming to themselves to prescribe to the speakers what topics they are to be allowed to bring forward, or, in short, to dictate to them in any way whatever how they are to deal with it. The Council did this in the discussion on Strikes, and the consequence was that the whole affair has received, in the newspapers and elsewhere, the ridicule it deserved. And now they have improved upon it; for in the former case they did give ample notice of the restrictions under which the discussion was to be carried on; but last Wednesday they adopted the more ingenious plan of sending out their notices and invitations, as if for a perfectly free discussion "On the Defects of the Patent Laws," and then informing us, when we got into the room, that it was to be no such thing, but a discussion limited again to four distinct points, which the omniscience of the Council had settled to be the only conceivable defects in the patent laws, or the only improvements which can now be possibly required. And, moreover, the said points were dexterously contrived, so that by far the greatest number of what all the opponents of patents consider to be the defects of the patent laws could not by any possibility be brought in under any one of the four heads; and, as Mr. Cole very well knew, when he protested that nothing could be further from their wish than to exclude anything, long before the four heads could be decapitated everybody would be in a hurry to get away.

I must say the whole affair has a most suspicious aspect, from beginning to end. Last year there appeared in this Journal a series of letters against the patent system, as well as some others, by a writer calling himself "Cosmos," professedly in favour of patents, but evidently intended (a not uncommon device of anonymous writers) to play into the hands of the other side. The believers in patents were not likely to remain quiet under such provocation; and so out rushes Mr. Cole, C.B., a leading member of your Council, and a flaming hot patent-man, and fires off his patent revolver, loaded with three political economy books, at the *pirates;* and in case that does not sink them and finish the business, he challenges them to open combat in the Adelphi Theatre (of science, not of histrionics), any time next winter. The challenge is accepted; and at the opening of the centenary of the Society the great Patent Discussion is announced as one of the attractions of the season. But when the time comes, instead of an invitation to all the world to come and say their worst against patents, the Council engage an experienced and skilful patent lawyer to open the proceedings by reading a long paper on their side of the question, and that not on the simple, and obvious, and expected title of "The Patent Laws," but with the artificial and complicated title of "The Laws relating to Property in Designs and Inventions, and the Effect of such Laws on the Arts and Manufactures." No change is ever made from the simple and obvious way of doing anything without some object, and that object is not very likely to be the advantage of the other side; and however the restricted speeches which the Council allowed to be made on the second evening may have glided into the subject of patents generally, those who were present on the first evening will remember that the only unrestricted speech which was made in reply to Mr. Webster's paper, was merely a reply to his arguments, and avowedly abstained from bringing forward any independent topics, such as would have been brought forward in an unrestricted discussion on the patent laws simply.

Moreover, by this mode of managing the business, the advocate of the Council and the patent laws got the last word in the debate. That, however, I am far from regretting; because I think Mr. Webster's two attempts to re-establish and patch up the broken-down analogy of copyright and patents have now settled that point for ever, after his five months' preparation to answer my letters in the first instance, and a week more to elaborate

(a) This letter, as well as the following one by "Cosmos," was postponed last week on account of the press of other matter. These letters must close the discussion on the patent question for the present.—ED.

his final reply to me on his own point, of the possibility of somebody else writing "Paradise Lost," if Milton's copyright had not prevented it.

I acknowledge with equal satisfaction that the discussion on the Council's second point, of "preliminary examination," has settled that question too. Mr. Webster even could not stand against the evidence and the arguments—all from patent advocates—against his favourite scheme; and the grand scientific Board for granting and refusing patents, has now subsided into a mild form of consultation office for giving advice gratis to poor and ignorant inventors. So, whatever may be the defects or evils of the patent system, we can no more be told that they are to be cured by the nostrum of preliminary examination, or Commissioners of Patents.

Of the other proceedings of the third evening which was devoted to the subject of the patent laws, I will say no more than I have said already, here, and at the meeting. If the patent gentlemen really conceived the scheme of getting the readers of the *Journal*, and the public, to believe that there had been a long discussion at the Society of Arts on the patent laws, and that nobody suggested any defects in those laws as now amended, except that perhaps the cost might be still further reduced, I flatter myself their sport has been sufficiently spoilt already. They can never refer to this discussion for any such purpose, without it being immediately thrown in their teeth, that it was no wonder no defects were pointed out, because the Council took very good care to prevent it.

But, suspicious as all this looks, I am bound to say that I do not myself adopt the suspicion that the Council had any such design as I have just now stated. I attribute all this injudicious and mischievous meddling and "managing" to a very different cause. We know that some of the patent agents told the House of Lords that there was certainly a great outcry made against the patent laws, but only by persons who knew very little about the subject; that those laws were probably as nearly perfect as any other laws, even before the amendments; and so forth. We heard one of the patent advocates, on the first night of the discussion, begin by denouncing the "gross ignorance" of the only person who had then spoken on the other side. The second evening, we had the same amenities repeated, in the same language by Mr. Webster, and in milder language by other speakers on the same side. The third evening, Mr. Cole himself (who is evidently to be regarded as the representative of the majority of the Council on this subject) attributed the obstinate anti-patent delusion of his colleague, Mr. Winkworth, to that peculiar kind of infirmity which he designated by "a bee in his bonnet;" and of course we are to understand that all the other members of the Council whom Mr. Cole cannot drag along with him are similarly afflicted.(a) I am happy, therefore, to be able to adopt the more charitable conclusion, that the Council were honestly persuaded that no reasonable being could possibly have anything to say about any conceivable defects of the patent laws, except in connexion with the four points which they allowed to be discussed; and as they of course only wished the time of the meeting to be occupied by reasonable beings, they naturally thought it better at once to exclude anything that unreasonable ones might have to say.

But having thus acquitted them of all dishonest intention, they must excuse my saying that they will do wisely to avoid all possible suspicion of unfair interference for the future. The Council of the Society of Arts (as at present constituted) consists of men, not angels; and as men, they necessarily have opinions, it may be prejudices, on any subject which they consider important enough to propose for discussion. And therefore, besides the insuperable objection which people in this country have to any interference with the freedom of discussion (beyond the due preservation of order, which they always willingly concede), there is this special objection to any such interference on the part of your Council—that it is certain to be attributed to a desire, if not to a deliberate scheme, of the active majority of that body, to bring out a result favourable to their own views; and consequently, it is certain, if not stopped at once, to bring the whole of their proceedings into contempt.

Yours faithfully,
E. B. DENISON.

P.S.—Do not imagine that I write this letter because I want any further discussion on the subject of patents. It has occupied the time of the Society quite long enough for this year, and longer than it need have done, if it had been properly conducted by those who invited it.

42, Queen Anne-street, 13th Feb., 1854.

(a) Has Mr. Cole forgotten who it was that told the Lords' Committee that a mathematician who invents a new formula or method for shortening calculations, or obtaining results which have hitherto defied calculation, "*has a monopoly of the formula, if he does not choose to declare it; and that you tempt him to declare it for your advantage by telling him that you will give him a limited monopoly in it?*" I doubt whether Mr. Cole and Mr. Webster can find, in the whole range of the anti-patent speeches and writings, anything that for misapprehension of the subject and object of patents and patent laws, misapplication of words, whose meaning is well known to every educated person, and utter confusion of ideas—the "gross ignorance" I omit—can match this one sentence, No. 1877, in the Evidence of 1851.—E. B. D.

PATENT LAW DISCUSSION.

Sir,—The final result of the discussion on patents, originally arising from Mr. Denison's assertion, seconded by Mr. Scott Russell, that they agreed "with the eminent men who considered patents an obstruction to science," thus far, is conclusive in favour of protecting the interests of inventors by law; and the further question has arisen, how the patent law may best be amended to diminish the evils of litigation after facilitating the obtaining the patents. "If," says Mr. Denison, "there is to be a patent law, the inventor ought to be provided with it at the lowest possible cost."

With regard to preliminary examination, Mr. Prosser, in a clever and logical speech, showed cause why a man should be granted a patent without examination, other than his own, now that the valuable labours of Mr. Bennet Woodcroft had rendered to inventors, or was about to render, for the first time, the means of examination.

I agree with Mr. Denison thus far as to "lowest possible cost;" that the cost should comprise such an amount as would enable the proper officer to search and point out to the applicant any prior patent interfering with his application, leaving it to his own option to take it or not. If, for example, any one could apply for a patent, and obtain it without any charge whatever, the office would be soon heaped up with lumber, and such a fee should be paid as would prevent mere wanton trouble. Five pounds would be sufficient for this, and the amount should be retained in case of the applicant declining after application, and the notice of the examiner should remain as a record for future use. There seems no reason why the subsequent £20 should be paid as fees for stamps, and Attorneys, and Solicitor-General's mock examinations. The payment of £50 at the end of three years should be subject to modification. If the applicant could show that he had used due diligence in making his invention known, and had not been successful, he ought not to be punished with a further penalty. It is notorious that in many cases ten or twelve years elapse before attention can be called even to a valuable invention. And so with the payment of the £100 at the end of seven years, upon precisely the same principle, that loss or failure of profit, at present constitutes a reason for renewal after the expiration of 14 years.

Mr. Stansbury was successful in showing that the

American plan of examination was unsatisfactory, owing to delays; but he omitted to state also the possibility of inefficient faculty in the examiner, and the other possibility—collusion for interested purposes.

Mr. Winkworth, in proposing that the patent law should be inoperative till all parties could agree upon all the details, certainly arrived at a very desirable position for the opposers of patents, laying all patentees open to infringers for the time being without a chance of legal remedy. This would certainly be a manufacturer's paradise for all those desirous of using their neighbour's brains gratuitously. The gravity wherewith he proposed it would lead one to the supposition that he was personally desirous of experimenting without risk under the mask of fair dealing.

I will here endeavour to correct a mistake in the otherwise able letter of Mr. Rock. It is in the use of the term "right," and it is a very important thing that words should express exact meanings. Mr. Rock contends that an inventor has three rights—natural, social, and legal.

If by the term natural right, is meant a right of property, it can only apply as a natural *power* amongst men, to seize and apply natural things for their individual use, and natural power in others to prevent them. Providence thus *providing*, that the best and most certain share should go to the strongest, to keep up the race of the *best*, or aristocracy of nature. That which is in an inventor's brain he keeps to himself, not by right, but by power. If he promulgates it, it becomes as much a matter of common scramble as the wild animals of the forest. If a hunter amongst a savage tribe invents a new bow, it is worth nothing unless he uses it; if he uses it, other hunters can imitate it, if they see it.

Social rights can only be a species of unwritten law—common law, as the lawyers phrase it—agreement or conventions—such as the right of way, footpaths, &c.

Legal right is a thoroughly intelligible term. It is the *rectus*, the ruled—ruled by agreement, real or supposed, of the whole community—something made straight, plain, and not to be disputed—a privilege conferred in return for an agreement to do something equivalent in value. This right may even be an injustice, but it must bear the semblance of justice or it will be defeated. The famous Duke of Newcastle said, "I have a right to do as I like with my own," when he turned off his obnoxious tenantry. If he had this right, so had all other landholders, and they might have said to the whole people of England, "it is our intention to convert all the land into a hunting ground, so confine yourselves to the highways, or walk into the sea at your option." The absurdity would at once appear—it would be seen that no right could exist without a corresponding duty, and that land could only be held, in right of well managing it, for the general benefit of the community, the equivalent being rent.

The term *right*, in a natural sense, is applied to the supposed laws of the Creator, according to man's interpretation. Thus it is not right, in a state of civilisation, to be cruel or tyrannous, but it is right in a state of nature. It is right for lions and tigers to eat surplus cows and bulls, that would otherwise, by over breeding, die of starvation. It is right for tribes of Red Indians, when game disappears, to kill one another in war, rather than to die of slow starvation, whereby the race would be deteriorated as well as lessened in number. It is very important to distinguish between the word *right* in the adjective sense, and *right* as a noun substantive. The one may be a matter of opinion, while the latter is positive law.

In speaking of patent law as it exists, it is a question of rights. In speaking of proposed reforms it is a question of what is right to do with a view to the progress of society.

After all the talk and discussion, after the acknowledged fact that Lord Granville, the opponent of patent rights, failed to get any number of influential backers, we may assume that the right of property in original mental efforts is really regarded as desirable by the community, on the ground that the progress of humanity or civilisation, or the arts conducive to civilisation, is thereby hastened.

Hitherto mental efforts have been regarded from two aspects. Mental efforts exhibited in printed books are protected as property for three generations, and the property is already to some extent international, and no doubt will eventually be much more widely so. Mental efforts exhibited in design get a three years' protection. Mental efforts in some forms of matter get the same—mental efforts exhibited in matter illustrating a principle of mechanics or chemistry get a protection of from three to fourteen years, at the option of the producer and his power of payment. Yet it is not easy to point out why a new book should be a property for three generations, and a new machine only for fourteen years. It does not seem equitable that a successful patentee should be confined to fourteen, and an additional seven years, because he happens to be in advance of the time for public perception of the utility.

The subject of a patent is a new invention which may be useful—in any case it must be something new. But it is an aphorism that "there is nothing new under the sun." If a thing is proved to be not new the patent is void. The ancient Greek fire is said to be lost: but if it were rediscovered it could hardly be subject for a patent, for it would not be new. The question then is—what is to be considered new. The proper answer is, that when a thing has been forgotten and gone out of use for a certain number of years it should be considered as new, and a fit subject for resuscitation, as a rediscovery fit to be rewarded for making patent to the public; say a period of from thirty to fifty years. If the patented invention has not come into use during the first period of fourteen or more years, and by no fault of the patentee, he should then be entitled to a gratuitous renewal.

But in order to ensure the greatest benefit to the public, it should be incumbent on the patentee to grant licences for the use of his invention after its successful introduction, at the same rate of royalty he himself might charge. A certain proportion of this royalty should accrue to the state after a certain amount of success and profit. And the state, possessing this interest, should take upon itself the costs and charges of defending the patent at law, or of preventing infringement, precisely as in the case of other taxes. This would be a better method than leaving it to the patentee. It may be said that the state would be tyrannous to individuals; but again, on the other hand, bodies of manufacturers can join together, and be very tyrannous to a patentee. It does seem objectionable to make the continuation of a patent depend on instalments of fixed sums of money, 25*l.*, 50*l.*, and 100*l.*, when perhaps no profit has been made; but a tax on the principle of an income-tax does not seem objectionable. And, again, when large profits have been made, it seems unfair that the contribution to the state should be no more than that of the patentee with small profits. Wealthy patentees prefer a high rate of payment at the outset, because that constitutes a practical monopoly, and limits the trade, by keeping out rivals. But this is an injustice to poor inventors. And, again, if inventors grow rich by a successful patent, there is no objection to their paying a tax out of a thriving exclusive right. In this mode progress might contribute largely to the expenses of the state, acting and reacting favourably both to inventors and the government, possibly ultimately furnishing the chief source of revenue, and removing the objection to individual monopoly. A man does not object to pay taxes when his trade is thriving, though he does while his profits are small.

As regards the mode of determining the validity of a patent by law, it does not necessarily follow that it should be costly. The great amount of costs arises from antiquated absurdities. Proofs and evidence are surrounded with all possible difficulties and technicalities. It is held that a patent is not valid till it has been tried at law. As the case at present stands, the whole thing is

obscure. The jury are frequently ignorant, and the judge directs. The judge may be prejudiced. Formerly, all judges were enemies of patentees; now, they are commonly friends of the patentee. There are two points of evidence,—evidence as to fact, and what is called scientific evidence, as a matter of opinion. The practice of oral evidence increases the expense, because men of large business do not like to go from home. In scientific evidence a written report would be more definite than a verbal examination; and if a scientific man were inclined to give an untrue opinion he would be more chary of doing it in writing than in words. And in what is called the science of patent disputes, the greater part of the mechanical questions, if properly stated, resolve themselves into questions of common sense. If the whole question in dispute, stripped of verbiage, with specifications and drawings, were placed before a single competent man, uninfluenced, there would be little doubt of a just verdict; and an intelligent jury, with the same facility, would come to the same result. The scientific authorities could give their written reports, and the witnesses to fact could be verbally examined, and the question of evidence and time reduced to the minimum amount of cost. And, moreover, there should be a limit to the multiplication of scientific evidence, by confining costs to simple requirements. It ought not to be competent to a rich man to overwhelm his poorer antagonists with a phalanx of great names, for the purpose of confusing a question. When Mr. Woodcroft shall have completed the list of specifications and put them at a cheap rate into every man's hands, mystery and verbiage will disappear, and the plethoric purses of rich men will not outweigh the plain facts of a case. Courts of appeal might exist, as now, but courts of appeal need not be costly, unless they are regulated by men having an interest in cost. Salaried judges would have no interest in multiplying, but in reducing useless proceedings. Barristers and solicitors, wishing for work, have a positive interest in the multiplication of forms. They look out not for mere food, but also for "refreshers."

The chief points may be thus summed up.

1. Exclusive privileges in property for mental efforts in written and printed books, in works of art, in music, in designs of form and colours, in chemistry and in mechanics, ought to be granted to individuals for limited periods, —provided such things shall be new, and tending to advance the progress of humanity in general utility, either directly or indirectly, and are clearly and efficiently made patent to the public.

2. As it is desirable to keep in use all things once discovered, and not to lose them, and as in the discovery of new things which can be made more profitable under a patent right by greater apparent cheapness, existing things are apt to go out of use and get abandoned, everything ought to be considered as new, or a rediscovery, and available for a patent which has gone out of actual use for a period of forty years. The things may, though useful in themselves, have gone out of use from difficulty of production at a past period, by which difficulty, though subsequently removed, the things themselves are forgotten.

3. The exclusive privilege or patent should be granted after notifying to the applicant, if it be not new in the judgment of the examiner, by the payment of 5*l.* at the time of application, one moiety to be retained if the applicant withdraws his application, to pay for the trouble, or a second 5*l.* to be paid on completion.

4. The term of the patent to be 14 or 20 years, and to be renewable without cost, on the inventor showing that he has been unable, after using due diligence, to bring his invention into successful use so as to produce him a sufficient remuneration.

5. The inventor, after perfecting his invention, should, after the expiration of two years from that time, license any other persons applying to use, and paying to him the same rate of royalty that he himself may charge on the articles manufactured, unless in the case of such patents as may require extensive buildings and machinery, *i. e.*, the outlay of a capital exceeding ——. Patents worked by joint stock companies to be at liberty to refuse licences to others.

6. In consideration of the State taking on itself the expense of making valid the patent by law, the inventor shall pay over to the state twenty to twenty five per cent. of all the royalties accruing to him after repayment of his outlay, as a tax towards the general revenue of the country—an income tax on successful patents—or he may have the option of defending his own patent, and paying no tax on royalties. Poor inventors would thus be enabled to defend their rights against the wealthy conspiracy to crush them.

7. International patent right to be encouraged on the principle of international copyright in books, in all cases where the inventor may elect to pay a division of his royalty profits to the state. Thus each state would receive its share of profit from the inventor, and become interested in maintaining his rights; but an art or manufacture existing in one nation, should not invalidate a patent in another nation where the art had not been known for forty years. Not all patents would be international; but the greater the number of sources from which nations and states could receive resources jointly, the greater would be the security for universal peace.

The scheme thus roughly sketched is worthy the elaboration of an adept in jurisprudence; and I confess that I should greatly have preferred to see Mr. Webster and Mr. Denison on opposite sides in the discussion. I looked on the two men for the first time, and felt that Mr. Webster was in his vocation, and Mr. Denison was not. Mr. Webster appeared to belong to the old school of patent advocates; Mr. Denison, by a *lapsus linguæ*, an unconsidered expression, had been thrown into the ranks of mere pretenders, charlatans, progress impeders. There be good brains under those square brows, and the veritable faculties of a manly inventor, or I mistake widely. He is not a charlatan with a wig and a gown, and a "Mr. Facing both ways," expression of countenance, as his letters in the Journal, written with the mere glibness of an advocate conscious of a wrong cause, had led me to believe. He has passed through a phase common to many inventors. "They invent as hens lay eggs," without much effort; but they do not hatch. Mr. Denison invented and hatched a lock, which Mr. Hobbs has certainly sanctioned in the work on locks, written jointly by himself and Mr. Tomlinson, as possessing "the merit of containing considerable novelty in construction, with security;" and Messrs. Hobbs and Tomlinson express their "conviction that, in the present state of the art of lock picking, this lock may be considered as secure."

Though Mr. Hobbs's name is not appended to the work, it is stated in the preface by Mr. Tomlinson that "each sheet, as was received from the printer, was submitted to Mr. Hobbs, who read it with care, and made his annotations thereon." "Mr. Hobbs and I had a meeting when the additions and corrections were read and discussed, and admitted or rejected as the case might be. The sheet having been thus corrected, was sent to press."

I confess to having doubted the accuracy of the statement, that Mr. Hobbs had given such an opinion, and therefore make the *amende*.

Pleased with his success, with comparatively little effort, Mr. Denison naturally felt generously disposed to the public, and condemned the lucre spirit which he judged to prompt patentees. I have myself passed through this phase when younger, and, on the impulse of immature thought, deemed that it was desirable that teeming brains should be safely delivered for the benefit of a nonentity—the public. My brains were delivered of some things, which any one might have picked up and used, and they were useful things, too; but no one thought it worth while to hatch the eggs I had laid.

Mr. Denison was modest; he did not trust wholly to

his own opinion, but "he agreed with the many eminent persons who considered patents an obstacle to science."

They were hasty words, but who will quarrel with them who reflects on the valuable discussion they have brought forth. "Begin nothing of which thou hast not well considered the end," says the Eastern proverb. Mr Denison had not considered, he merely *assumed* the eminence of the men, but did not analyse in what their eminence consisted. He had some vague notion of a host of anti-patentees to be found in the Blue Books and elsewhere, and he knew that Mr. Brunel, Mr. Scott Russell, and Lord Granville were eminent, *i.e.* their names were commonly before the public. But he did not reflect that there is a class phrase, "bad eminence;" that a man in the pillory is as eminent personally as a preacher in the pulpit.

"Where Cibber's brazen brainless brothers stand,"

was doubtless a position of eminence, and so was the strange architectural deformity of King's-cross, whereon was erected the statue of the Fourth George, done in emblematic brick and stucco—emblematic of the bad taste in architecture of Nash and his patron. A cardinal, also, is entitled "Your Eminence." But none of these conditions of eminence is applicable to the question of exclusive privileges in arts and manufactures. Mr. Denison has set up false gods, but an enlightened audience will not therefore cry out, "Great is Diana of the Ephesians." Not even though Mr. Denison could prove the possession of mechanical aptitudes by Messrs. Russell and Brunel, not thereby would he prove disinterested the opinions they might give, and for aught of these gentlemen that is practically and definitely before the public, Mr. Denison himself may take precedence of them as an inventor. He must not march through Coventry with them. As for Lord Granville, the Coryphæus of these latter assaults upon inventors, it would seem as though his great patron, Prince Albert, had given him leave to tempt inventors to their own ruin, as Satan tempted Job of old, and with a like result. Throughout all the land only eight men, and those interested, were found to echo Lord Granville's words—Lord Granville's wish—that mind should be the serf of matter. It would have been instructive to look on his downcast visage, when he presented himself before the Prince, with his "If, peradventure, eight men can be found to testify against them, wilt thou destroy the patent-right-eous men for their sake." It is quite conceivable that the Prince would reply, "Of a surety I will not, for surely it is those men who are the hope of the world; it is those men who win the world from the wilderness; it is those men who rescue our race from poverty; it is those men who create the wealth of the land; it is those men who extinguish brute power; it is those men who promote reform and prevent revolution; it is those men who are the salt of the earth; it is those men who rule the wild waves, and make smooth the rough places of the land; it is those men who will extinguish war and promote peace; it is those men who remove the obstacles to man's progress, and permit his faculties to develope themselves, and 'shew likest God,' when 'mercy,' the mercy springing from conscious power, 'seasons human justice.' It is those men who say, men shall be Englishmen and not Chinese, to be gradually overrun by external powers grown greater than they are, after so long culminating in the zenith." Not "hero of a hundred fights," but hero of thousands and of millions of human hearts will Prince Albert be, as time rolls on, for taking the high intellectual view of the obstacles to human progress, and taking the lead in sweeping them out of the path.

I trust that Mr. Denison will be "saved as a brand from the burning," now that opinion in favour of patent laws is pronounced, in union with the known opinion of the Consort of the Queen, and probably the Queen also. I trust that he will give the efforts of an unembarrassed mind in favour of the good cause, aiding to procure for us a patent law that shall be a model of statesmanship; a patent law of which the highest philosophers may approve; a patent law that may check litigation without impeaching justice; a patent law that would unlock the faculties of Mr. Denison's brain in a gush of generous emotion, at working bravely for the human race, as he thought he was, in giving them his technical inventions. Let him continue to give if he will, of his technicalities, but let him give also of the larger qualities of his brain; let him invent wise laws that may give him standing amongst philosophers, by uplifting humanity, rather than connive at the jobbing statutes whereby "eminent men" seek to augment and perpetuate the debasing institutions of caste. Good patent law and good partnership law are the Castor and Pollux, the lambent flames, that play around the path of progress, and light the way of the discoverer.

Let Mr. Denison ponder on these things, and he will be, not a changed man—for as he was created so must he remain—but a man with a definite and specific cause before him, in harmony with his own true nature.

I am Sir, &c.,

COSMOS.

February 14, 1854.

ARTIFICIAL BREEDING OF SALMON AND OTHER FISH.

SIR,—The notice which has at last been taken in order to re-store the streams and rivers of the kingdom with salmon and other of the finny tribe, may render an account of the reasons and commencement of my system of "artificial spawning, breeding, and rearing of fish," not unacceptable. The naturalists of the Continent are not only examining the truth of the example I have set for the last fifteen years, but are also carrying the same into extensive practice.

The Chinese were the first people who introduced "artificial breeding of fish" by capturing brood fish just emerged from the egg, protecting them, and feeding them until in a fit condition for food. Herr Jacobi, a retired military officer, a native of (and living near) Osnaburg, in the Hanoverian States, about the year 1756 or 1758, I believe, was the first who attempted to take the spawn and milt from the live parent fish for the purpose of impregnation and production, and after some five years' of experience and attention, and proving his arrangements, introduced the subject to Count Goldstein, a talented naturalist and literary person, who published the account of Jacobi's experiments: the subject, however, died away, like many others at that period.

In 1821 and 1822 our celebrated countryman, Sir Humphrey Davy (whom I personally knew), with his friends Sir Francis Chantrey, the sculptor, Mr. Pepys, celebrated for his chemical knowledge and improvement in British steel, with many others, attempted artificial spawning, &c., at Mr. Hamlett's, on the Colne, near Uxbridge, Middlesex, but failed, not producing more than five per cent. of brood.

In 1815 I went to Leipsic, in Saxony, and being on visiting terms with all the professors in the University, I had an opportunity of attending their evening parties, which invariably produced delightful discussions upon moral philosophy, natural history, and the arts and sciences. Here it was where I heard the first discussion upon cold-blooded animals, the peculiar character of their habits and existence, and which prompted me to go deeper into the inquiry. My sojourn in that country was of some years' duration, in the interim of which I learned the system of stocking ponds from a gentleman who possessed twenty-two of large extent, seven of which were fished annually, and eight every third year, the profit of which produced him about 6000 dollars per annum, and from his correct system the ponds never deviated in the course of fifty years from yielding the same weight of fish! During my stay in that country my friends and self went

through various processes with fish of various descriptions, toads, frogs, and efts, all producing their young on the same terms and principle, not one of them possessing any sexual organ.

In 1823 I returned to England, and followed up mercantile pursuits; and 1838 I had occasion to go to Newcastle-on-Tyne, where I sojourned some seven weeks, during which period a gentleman came to the same inn who was proprietor of a considerable salmon fishery. In the course of conversation I related to him all the circumstances of artificial spawning. This gentleman proved to be Sir F. A. M'Kenzie, who published in 1840 some letters upon his success in the art.

In 1841 I published my first treatise upon fish in ponds, and that same year had upwards of 20,000 trout bred out upon my artificial system. This stock I reared at Denham Fishery, on the Colne, the property of Mortimer Drummond, Esq., and did not lose an egg: all came into life. About this period, or a little before, a dispute arose between the naturalists of the north of England as to the distinction of samlets from parr. Both Mr. Shaw and Sir F. A. M'Kenzie bred the salmon eggs taken from the bed and placed in artificial bends of the streams. In the dispute Mr. Shaw concluded that parr and samlets, smolts or lastsprings, were synonymous, on account of their bars. There is a trout, however, the "stone trout" of the Germans, which possesses the same bar, and exists in Cornwall, and is termed the "saddle-backed trout;" they never exceed a pound in weight, and where they exist no salmon can get to the same water. They always haunt under a stone, and dart for their food, returning to the spot from whence they came. I merely state this to cause others to make inquiry into these perplexing contradictions. From 1840 I have pursued the system of artificial spawning, and have restored many streams fully to the desires of the proprietors, invariably giving lessons and instructions to the bailiffs how to proceed for the future: some have profited, while others have not. The second pamphlet, on "Fishes in Rivers and Streams," I wrote in 1847 and published in 1848. This pamphlet upon artificial spawning, breeding, and rearing of fish, I am happy to find has created an emulation, and aroused the desires of others to follow my system, which, if undertaken and followed out with judgment and care, must lead to an increase of food, demand for labour, and great profit. In 1843 I was invited to go over to France for the purpose of restoring the rivers with fish, but after consulting with my friends I declined. Shortly after, in 1844, two poor fishermen in that country commenced operations, and partially succeeded, by the advice of Dr. Haxo. Others then took it up, and each claimed the priority but all breeding alike after my Denham arrangements, in narrow canals, bedded with gravel, and flowing water. This art, like all others, requires a schooling, and a little more attention than the rough uncouth operator administers; for instance, I believe I have bred millions of fish, yet I have never in fifteen years or seasons lost a parent fish, or found a single egg broken when expressed, and it is only the clumsy, unitiated operator that effects such a mischief. From close examination, year after year, from canvassing the great field of nature's chemistry, I found out that the eggs of fish merely required water and air. Water to be pure—and air, when the embryo life comes into operation, to invigorate the water with fresh charges of oxygen in order to stimulate life. Gravel, weed, or aught else, is merely extraneous, or an adjunct, not only of use when the animal attains life, but to entangle the egg in the position where instinct teaches the parent fish to deposit it for protection against the universal predatory habits of their kindred. From this ascertained fact I have now so simplified the system of artificial spawning, breeding and rearing of fish, that they can be produced in deep or shallow water, or in a room, and, according to the temperature of the room, either progressed or retarded in their incubation.

I received much assistance from Worcester in 1851, when I forwarded salmon spawn to Van Diemen's Land, by the order of Earl Grey, then Secretary to the Colonies, the result of which was highly interesting although not successful; the cause of the failure was owing to my obtaining the spawn a month previous to the sailing of the vessel, from which circumstance the brood came into life, according to the testimony of the captain, on this side of the line, and the vessel being becalmed there for three weeks, the young brood died of excessive heat. This experiment proved that neither salmon nor trout require running water for their propagation, which has hitherto been the theory insisted upon by philosophical writers and practical men of fishing pursuits. With this knowledge we enter upon new grounds for the breeding of fish, and as I deem myself the original promoter of artificial breeding, &c., I have procured patents in order to protect myself from a second series of piracies. I cannot close this statement without drawing your attention to the subject of the propagation of eels, which was canvassed at Worcester in 1851 by an anonymous writer of Clitheroe, demanding of me in a very imperious tone to give him all the information upon this extraordinary fish, which I felt no inclination to give. This party I believe to be one of those connected with the artificial breeding in the north of England; if so, and he is adopting the process described in a pamphlet lately put forth to the public, a serious mischief will take place in the fishery, besides the destruction of at least 60 per cent. of the eggs he obtains by the proceeding.

When I shall have completed my arrangements, and am prepared to deliver my new, cheap, and simple apparatus, I will take the opportunity of making it known to the public through the Society's journal. I am firmly convinced of the ultimate success of the system I have introduced, and of which several parties are now attempting to take the merit to themselves.

I remain, Sir, your obedient servant,

G. BOCCIUS.

Broadway, Hammersmith, 31st Jan., 1854.

In addition to the foregoing communication, Mr. Boccius writes as follows to Mr. Flinn:—

"The view you have taken in your letter, of salmon having had two great runs for killing during this past season, I should say was quite correct, as your rivers have been vitally disturbed by the serious floods. And I think with you, that there are many old fish yet hanging back for the equinoctial freshes; these will be large old fish, and die from exhaustion after spawning. If spawners yet are to be had, I wish much to obtain one or two females and one male, as I have still an opportunity of transmitting to Van Diemen's Land in March.

"The two fish upon which I intended to operate were not strangled, but frozen to death from the snow-ice in the bed of the river. Strangulation would in this state have caused an emission of all the ova and milt, as the gills, which are the lungs of the fish, being compressed, the fish becomes in such a state of depletion that all passes away involuntarily."

Mr. Young, of Invershin, also writes to Mr. Flinn, in which he says:—"I approve very much of your proposal—allowing that the flood-gates of the weir at Powick be made a pass for the salmon, a very small aperture would be sufficient. The fish will go up any rapidity of current if it be but a short distance; and all the water that could escape can have little effect on the quantity required for driving machinery even in the driest season.

"We have nothing in vogue now in Scotland but artificial breeding of salmon. The establishment on the Tay at Stormontfield is yet the most extensive, having got 400,000 grains of ova deposited in the boxes; and great things are expected in the shape of an increase of the salmon, but how far they may succeed in that respect

is something doubtful. Artificial breeding is useful in planting rivers, and where the seed is deposited and the nursing of the fry left to the production of the river; but when they have to be hand-fed in an artificial pond, where the water is not even the same temperature as the river, I would even have doubts of what is actually reared returning to the river after going into the sea. The fish have some instinct by which they know the taste, temperature, or quality of the water where they are bred, and they return punctually to the same river; but whether they will gather a new instinct and return to ponds, again to be fed on brown bread and hashed flesh, is yet to be seen.

"We had an excellent spawning time, from September to the break of the storm. We never had too much water at any time, and the rivers were never too low. Since the storm broke, the rivers have been too high for fair fishing, but not so high as to injure any of the spawning beds. We have got some fine salmon with the rod, and also a few with the net, but not the number we would have got had the river been less. However, from the number raised with the fly and not caught, we are sure that many fish are up."

RUTHVEN'S PROPELLER.

SIR,—In reply to one of your correspondents of last week, who inquires as to the difference between Ruthven's and Busk's propeller, I may say, in the first place, that they are the same in respect of the principle on which the propelling agency is generated—namely, the reaction of jets of water issuing from orifices in the sides of the hull.

There the identity ends. Busk provides an air-vessel into which he forces the water by pumps or other means, which he leaves quite undefined; this vessel extends across the hull, and projects through the sides, and is fitted with a pair of sluices at each extremity, through which the water is permitted to escape, astern or ahead, and in regulated quantities. Ruthven, on the contrary, specifies a particular fan-like centrifugal pump, for the purpose of expelling the water; he employs no air-vessels; he has no sluices, but employs equivalent means of reversing the flow of water by the use of revolving nozzles; and he otherwise shapes the waterway from the entrance to the two exits, so as to facilitate the passage of the water through the machine to the greatest practicable degree.

Another thing Ruthven has done. He has obtained a better result from his propeller than has been obtained from any other propeller of the present day.

I am, Sir, your obedient servant,

C. E.

NATURE PRINTING.

SIR,—As the subject of Nature Printing in various forms seems to be attracting some attention, I beg to place at your disposal, for inspection by members, a small collection of prints of ferns, grasses, and other plants, obtained by me from dried botanical specimens in 1847, and exhibited at one of the meetings of the Botanical Society of London, as may be testified by the secretary, Mr. Dennes, and by the treasurer, Mr. Reynolds. I remember, indeed, that the latter said that he had made similar attempts with like success. It must be borne in mind by those who may inspect my prints that I had no better press for producing them than a carpenter's vice. The specimens were blackened on both sides with common printer's ink, and then pressed between the two folds of a sheet of white paper previously somewhat moistened, with a certain thickness of blotting paper and flannel between them and the pressing boards. I was anxious to try the experiment of transferring a careful impression to a lithographic stone or sheet of zinc, but living in the country and being in bad health at the time, I had no opportunity of doing so; and, indeed, my proofs remained neglected, and almost forgotten, till a few weeks ago, when I fortunately turned them out of a drawer with a medley of similar contrivances.

I feel confident that by adopting a more perfect, as well as a more expeditious mode of inking the specimen than the very primitive one which I employed, and with a little more practice in the manipulation, this real and direct *printing from nature*, might very well be utilized as a means of cheapening and consequently extending the acquisition of botanical knowledge. On the other hand, lithographic transfers will not only afford a means of multiplying the identity of the very best proof which can be obtained, but also of adding the valuable resources of chromo-printing, so peculiarly applicable to the representation of plants and flowers.

I remain, dear Sir,

Your's very truly,

T. TWINING, JUN.

NATURE PRINTING.

SIR,—The publication of Mr. Aitken's paper in your last week's Journal, and the reference in it to "Nature Printing," induces me to state what I believe to be the respective claims of the different persons connected with that invention. Four distinct steps in the invention have been described. The first is that practised by me in 1847, and published in 1850, viz., the use of gutta percha for receiving the impression of the object, which was then electrotyped, and the electro-deposited plate used as the printing surface. By this method, and by this alone, can the impression of a *fresh* plant be converted into a printing surface. The second step is that so successfully carried out at the Imperial printing-office at Vienna, and introduced into this country by Messrs. Bradbury and Evans. The Viennese printers substituted lead for gutta percha, and printed from an electrotype copy of the lead impression. In order to obtain a sharp impression in the lead by rolling pressure, the object to be engraved must be thoroughly dry, consequently recent plants and soft objects cannot be used. The third step is that proposed by Mr. Aitken, viz., the use of Britannia metal for receiving the impression. The object to be engraved is placed between two plates of Britannia metal, and passed between a pair of steel rollers. The impressed Britannia metal is then used as a *direct* printing surface. By this method the electro-deposit is altogether dispensed with. The objection to it is the fact that, when printed from, a comparatively limited number of good impressions only can be obtained; certainly not a sufficient number for mercantile purposes. The fourth step is the application of the invention to lithography. This step is claimed both by Mr. Aitken and myself. It is clear, however, from the allusion to it in Mr. Aitken's paper, and from his non-allusion to it previously, that he does not regard the process very highly. From the experiments I have made I still hold the opinion which I expressed in your Journal of February 10th, that "lithographic nature-printing" is a "step in advance," and that objects thus printed, with all the advantages of Chromo-lithography, will far surpass any copperplate colour printing. The conclusion I would draw from the above statements is, that each process has its peculiar merits specially applicable to different classes of objects. The pulpiness of recent plants can only be rendered by gutta percha. Lead is the best medium for receiving impressions of the thicker-stemmed dried plants; whilst the more delicate flat plants yield a perfect impression in Britannia metal. From all these, more or less directly, can an impression be transferred to stone, by means of which an unlimited number of impressions can be obtained. Believe me, very faithfully yours,

FERGUSON BRANSON, M.D.

Sheffield, February 22nd, 1854.

NON-PATENT CHARCOAL RESPIRATORS.

SIR,—The paper read by Dr. Stenhouse on the properties of charcoal, would lead us to the conclusion that it is a desirable thing to find efficient means of living safely in pestilent localities. Without doubting the utility of his respirator, under certain circumstances, like Davy's or Stephenson's safety lamp, or the glass masks formerly worn by alchemists and the preparers of poisons, or the magnetic masks of needle-grinders, I demur strongly to his views of living surrounded by walls and ceilings of charcoal, in hermetically sealed dwellings, with breathing air supplied through charcoal interstices. For hospital emergencies his suggestions are useful, both for patients, and physicians, and surgeons, and not merely for respirators, but as applications to putrid and offensive wounds it would be well worth the experiment whether the charcoal absorbent would not promote the more rapid growth of healthy flesh, keeping a *cleaner* wound.

But I hold that all mere palliatives of evils are worse than the evils they are supposed to obviate. Improved fire-escapes are a premium on the continuance of dangerous combustible dwellings, and insurances are another; and the possibility of so contriving a dwelling as to live unharmed in miasma, is a premium to people to disregard drainage. For one house that would be efficiently and accurately constructed, fifty would be badly done, and people would dwell in a condition of false security. The house cracking, or the mask falling off, would induce poisoning, and the fire-escape might not be at hand when required. Palliatives ought only to be used in cases of necessity, but wise laws should provide for removing the necessity.

Providence has created the world for different persons. The ground best adapted for the growth of vegetables is precisely that least adapted for human dwellings. The clay soil that grows the best wheat is the most difficult to drain and make dry for humanity to dwell on; and of all localities swamps are the worst.

We are incessantly agitated with the question of drainage of the Thames marshes, whereon ignorant people, pressed by circumstances, have built dwellings, while they ought only to have grown cabbages and other succulent vegetation. The Greenwich market gardens, in a gradual process of conversion from a useful to a mischievous purpose, are a sample of our continuous folly—our penny wise and pound foolish propensities. Had Queen Elizabeth, years ago, made an Act of Parliament to the effect that—"Whereas there be a kind of people thronging to this our good city of London, who, not finding lodging, do lye about in the garden grounds on the opposite side of the river, and there from time to time build up huts and sheds to cover them, which gradually become permanent dwellings, to the deterioration of such persons as dwell in them, and to the loss of useful garden ground, for the supply of wholesome vegetables to our good citizens of London; and whereas such people do thus generate many fevers and epidemics, and other diseases, which do spread abroad and even attack those persons dwelling in healthy localities; and whereas it is unjust that the innocent should thus suffer for the guilty, it is hereby enacted that henceforth all owners of garden ground not fitted for human dwellings by reason of want of drainage and damp atmosphere, who shall erect or permit to be erected any dwellings thereon, shall be held guilty of crime and misdemeanour, and the dwellings shall be pulled down, and the inhabitants of them treated as squatters and vagabonds, and to be dealt with according to law."

Had such an act been passed we should not now be in the position of, and subject to, a similar class of evils with New Orleans, with dwellings below the water level. People should have been forced to dwell on the heights, and drainage would have been certain; and the greater extension of the metropolis would long ago have enforced the necessity of improved means of metropolitan transit; and Londoners might have walked in the season to eat their daily and weekly fruit in suburban gardens as they do in the environs of Spanish and Portuguese towns. I will, with your permission, return to this subject at a future time.

I was much amused with the mode in which the discussion took the form of the patent dispute, that has so long occupied the arena of the Society; but I must leave this question to its legitimate advocates, who will probably discuss it better than I can.

I am, Sir, yours faithfully,
W. BRIDGES ADAMS.

Feb. 22, 1854.

Proceedings of Institutions.

BIRMINGHAM.—The Polytechnic Institution, whose lectures partake much more of a literary than scientific character, has, as usual, had its weekly lecture—the subject, "The Life of Dr. Arnold." The lecturer, the Rev. W. Dale, in illustration of his subject, pointed out that though the career of Arnold was distinguished by little which was exciting, it nevertheless was an excellent study for mankind generally, however humble their natural abilities, or whatever position they occupied in life. Arnold's high estimate of the duties of life, and admiration of earnest working—his strange admixture of the Conservative element with reforming principles—his earnest piety—afforded excellent opportunities for illustration, which were taken advantage of, and judiciously used, by the lecturer, who alluded also to his sedulous devotion to his duties of Head Master of Rugby School, the fame he had brought to that establishment—his patient suffering, under abuse and reproach—until, finally, the reward came in his appointment to a professorship at Oxford. These various topics, entered into and improved, supplied a useful and instructive lecture. The proceedings were closed with a vote of thanks to the lecturer.

BROMLEY.—The eight annual Report of the Literary Institute congratulates the subscribers on the sound state of the affairs of the institute, which have gradually but satisfactorily progressed from the date of its formation. The register shows that in the years 1851, 1852, and 1853, the number of members was 157, 165, and 171, respectively; the number of volumes in the library 1692, 1815, and 1848, and the number of issues 2059, 2211, and 1861. The diminution in the number of issues was thought to arise from the want of a supply of recent publications. The members have therefore been solicited to make a voluntary increase in the amount of their subscriptions, such increase to be devoted exclusively to the purchase of books, under the arrangement made with some of the leading publishers by the Society of Arts. The negociations for the erection of a building suitable to the common purposes of a town hall and a literary institute have not been successful. During the year the library fund has been augmented by small money donations, and the general fund by the sum of 12*l*. 7s. 6d., the proceeds of three gratuitous lectures on Eastern subjects, delivered by S. E. Rolland, Esq.

LIVERPOOL.—A new step has been taken in the Upper School of the Collegiate Institution towards the furtherance of higher mercantile education, by the appointment of Mr. T. C. Archer to give systematic instruction in economic natural history. Mr. Archer is well known as the arranger of the collection of Liverpool imports for the Great Exhibition of 1851, and as the Liverpool agent of the Crystal Palace Company. His present course, at the Collegiate Institution, relates to Vegetable Physiology in its connection with commercial products.

LONDON.—On Wednesday evening, the 15th inst., the members and friends of the Domestic Mission Reading Room, at the Chapel-street branch of this institution, held their Fifth Annual Social Meeting. Upwards of 150 persons were present; and, after tea, the Rev. Wm. Vidler, being called on to preside, requested the singing-

class to open the proceedings of the evening by the spirited and appropriate song of "Old England." The chairman then gave an admirable address on the advantages attending a steady pursuit of knowledge. He said it was a mistake to fancy that the mere elementary requirements of reading and writing were in themselves knowledge; they were but as the keys to open the door to the vast stores of knowledge that lay in the world behind. He advised the members to eschew desultory reading, and to choose each for himself some one partilar branch of study, and master that before proceeding to take up any other. Above all, he cautioned them not to neglect the daily reading of that Holy Book, the precepts in which would be found most conducive to the present and future welfare of every human being. The Secretary followed, on the importance of early acquiring a taste for reading. He spoke of what a companionable thing a good book was—of the many active hours it would help to cheer and enlighten—of the many tried and tempted hours it would help to overcome—of the many idle hours it would help to banish—and of the many lonely or sorrowing hours it would help to bless. He took a more hopeful view of the light reading so much inveighed against at the present day, looking upon it rather as indicative of the infantage of study, and, like the sweetmeats of childhood, would ultimately give way before the more wholesome cravings of the man. The Secretary also gave a slight review of the proceedings of the reading-room during the past year, which showed that whilst 100 new volumes had been added to the library, their finances still showed a balance on the right side. He also spoke with affectionate interest of some of the former members, who had gone with the great tide of emigration to pitch their "moving tent" in what he hoped would prove to them a happy land. Above twenty other speeches, readings, and recitations, from different members, then followed, interspersed at intervals by singing from the class and from individuals; and the meeting terminated only too rapidly for the much-interested audience, who had themselves contributed all the essentials to their own pleasant, and it is hoped profitable, evening's enjoyment. By adopting the Society of Arts' plan of limiting each person to ten minutes, and by a little judicious arrangement beforehand of the list of agenda, it is remarkable what a pleasant evening may be spent.

NOTTINGHAM.—The annual meeting of the members of the Mechanics' Institute was held on the 24th of January last, the President, J. E. Denison, Esq., M.P., in the chair. From the report read by the Hon. Secretary (Mr. E. Renals) it appeared that the number of members was 1166, being an increase upon the year of 38. Of this number 128 are connected with the classes. The volumes in the library reach 5,590; and in the course of 1853 there were 42,515 issues of volumes to the members. Lectures had been delivered fortnightly in the large lecture hall, to which members of the different operatives' libraries in the town were admitted free. The audiences, on several occasions, were very numerous. The receipts for the year exceeded £900, £200 of which was applied towards the reconstruction of the organ, with the view of rendering it more efficient and attractive at the popular concerts. The admission of members of the different operatives' libraries to the course of lectures has been productive of the best feeling on the part of the working-classes, and is a step towards bringing them into closer contact with the institution. Sir Robert Peel lectured in the large hall of the institution on the 7th inst. The attendance was respectable and numerous. The net balance in favour of the Midland Asssociation was £30 11s. 5d.

SEVENOAKS.—On Thursday, Feb. 16th, a lecture was delivered by the Rev. G. Davis, of Seal, "On the Duke of Wellington, not as a warrior, but as a model of the English character, showing how much he has contributed to stamp a manliness and straightforwardness on the English people." The lecturer said, that on account of Wellington's long life and the number of volumes which required perusal in order to see his whole career, he believed the mass of the people had formed but a very inadequate idea of his greatness. We knew, perhaps, more of many of the heroes of Greece and Rome than we did of the man with whose career the prosperity of England was so intimately connected. The military genius of Wellington was far better known than his greatness as a man. His despatches might be appealed to as showing his inner life. Here his very feelings and thoughts were exposed to the review of the world;—and, as a comment on his actions, they showed his heart to be as pure as his hand was brave. The lecturer said, he would not dwell on Wellington's wars, because in that we could only *admire* him, while, in his character as a man, we could *imitate* him, and there was no one, from the peer to the peasant, who might not in moments of despondency and depression take comfort in the image of the great Duke struggling against accumulated difficulties, and be stirred up to fresh exertions in the path of duty and honour by his example.

STOURBRIDGE.—The last report of the Mechanics' Institute states, that the number of annual subscribers is 56, and of quarterly 135; being a decrease in the year of 4 and 10 respectively. Seven lectures were delivered during the year. There are three classes in connection with the Institute,—French, Music, and Discussion,—all of which have been most successful. During the last six months, a Penny Savings Bank has been established, and the report states, that even in that short time the number of depositors amounts to 300, and the total of deposits to £112. The expenditure has been £144 16s. 10½d., and the income £156 1s. 2½d. leaving a balance in the treasurer's hands of £11 4s. 4d. The liabilities are £75 18s. 5d., and the assets, £67 5s. 3., showing a total adverse balance of £8 13s. 2d.

Miscellanea.

PROPOSED MERCANTILE AND MARITIME COLLEGE.—Nine months ago we had occasion to state that a meeting had been held in the city, at which it was resolved that an endeavour should be made to establish a mercantile and maritime college, which might supply sound and extensive information on all branches of practical science, and afford the means of acquiring a knowledge of the principles which govern the various relations of commerce. A subscription list was opened, and a few members of the committee appointed at the meeting to devise means for accomplishing the object agreed to subscribe £2,000, in sums varying from £50 to £500. The committee communicated with the various city companies, considering that the primary design of these corporate foundations was to foster the trade and commerce of the city; but, thinking that companies, as public trustees, could not be expected to contribute largely towards preliminary expenses, the committee asked their support only in the event of the ultimate establishment of the college. We regret to learn that out of the 90 city companies only two or three took any notice of the application, and the answers of these were very unfavourable.—*Times.*

AUSTRALIAN POSTAGE GRIEVANCE.—A pamphlet, book-catalogue, or any unstamped paper, weighing under two ounces, may be sent to the United States of America on affixing to the wrapper *one* penny stamp; a similar parcel sent to India, and to most British colonies, requires *six* penny stamps,—but if sent to Australia, full letter postage, viz., *four shillings*, is required. American postage, one penny *versus* Australian postage, four shillings. Newspapers, however,—that favoured species of literature,—between Australia and England at a charge of one penny. Such an anomaly should never exist in a country which prides itself on the wisdom of its legislation. Why political information should have such an undue advantage over general literature is incomprehensible,—it is an absurdity for which the literary world in general, and the book-trade in particular, have to suffer. If the English government has any desire to retain its Australian dependencies, a rapid and cheap postal communi-

cation will be absolutely necessary. It is only thus that trade can fully develope itself, and a friendly intercourse between the two countries can be firmly established.—*Athenæum.*

BIRMINGHAM SCHOOL OF DESIGN.—The Committee of the Birmingham School of Design is at last considering, it is said, whether it cannot find accommodation for some 300 applicants, who have been waiting about 12 months for admission. A room has been found, in which it is intended to start an elementary drawing school. The admission to the Central School will be granted, and will follow on the application of the pupil, and his producing a drawing or study demonstrating his capability to comprehend and execute works of a higher class. The good effects of such a proceeding may be anticipated. The only objection to the scheme which can possibly be urged is, that instead of one elementary school there ought to be half-a-dozen, as 25,000 artisans in the town are engaged in trades to which a knowledge of drawing is an important auxiliary. At present the number of pupils attending the school, and which it will accommodate comfortably, is about 530! The success of the Elementary School will, however, determine future progress; and it is to be hoped that a greater amount of pecuniary aid will be supplied by individual manufacturers, who are to be the parties benefitted, than has been the case heretofore.

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Dr. A. W. Hofmann, "On Organic Chemistry."
Actuaries, 7.—Adjourned Discussion, "On Decimal Coinage."
Geographical, 8½.—1. Successful Exploration of the River Murray, by Capt. Cadell and Governor Sir Henry Young, in the *Lady Augusta* steamer; communicated through the Colonial-office. 2. Captain Sturt's "Observations on the proposed North Australian Expedition, under Capt. Stokes, R.N."

TUES. Royal Inst., 3.—Professor J. Tyndall "On Heat."
Civil Engineers, 8.—Mr. James Yates, "On the Advantages of Uniformity in Weights, Measures, and Coins."
Medical and Chirurgical, 8½.
Zoological, 9.

WED. London Inst., 2.—Mr. T. A. Malone, "On Elementary Chemistry."
Medical and Chirurgical, 4.—Anniversary.

THURS. Zoological, 3.
Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
London Inst., 7.—Prof. J. Tyndall, "On Magnetism and Electricity."
Photographic, 8.
Antiquaries, 8.
Royal, 8½.

FRI. Botanical, 8.
Architectural Assoc., 8.
Royal Inst., 8½.—Rev. Prof. Baden Powell, "On Certain Paradoxes of Rotatory Motion."

SAT. Asiatic, 2.
London Inst., 2.—Mr. E. W. Brayley, "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of Non-Metallic Elements."
Medical, 7.—Annual Election.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 16th February, 1854.

Par. No.
15. British Produce and Manufactures—Accounts.
34. Paupers—Returns.
38. Queen Anne's Bounty—Account.
37. Navy Estimates.
Poor Relief (Scotland)—Eighth Report of the Board of Supervision.

Delivered on 17th February, 1854.

6. Bankruptcy—Return.
43. Army Estimates.
16. Bill—Succession to Real Estate.

Delivered on 18th and 20th February, 1854.

45. British Ships—Returns.
48. Balances in the Exchequer—Return.
50. Ordnance Estimates.
23. New Palace, Westminster, (Commissions to Artists, &c.)—Return.
30. Grain, flour, &c.—Return.
42. Mail Packet (Orkney)—Copy of Treasury Minute.
47. Acts of Parliament—Return.
51. Population, &c.—Return.
54. Deficiency Bills—Return.
8. Bill—Friendly Societies.
Factories—Reports of the Inspectors.
Denmark, and Sweden and Norway—Correspondence.

Delivered on 21st February, 1854.

22. Police Force—Return.
46. Troops (Colonies)—Return.
48. South Sea Stock, &c.—Return.
52. Charity Commission—First Report.
12. Bills—Towns Improvement (Ireland).
15. „ —Public Prosecutors.

Delivered on 22nd February, 1854.

25. Channel Islands—Account.
19. Bill—Property Qualification.
Civil Service—Report, &c.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, 17th February*, 1854.]

Dated 11th October, 1853.

2330. C. Rowley, Birmingham—Dress fastenings.

Dated 14th November, 1853.

2638. W. Anderson, jun., and A. W. Murphy, Glasgow—Ayrshire sewed work.

Dated 10th December, 1853.

2880. J. H. Johnson, 47, Lincoln's inn fields—Moulding. (A communication.)

Dated 20th December, 1853.

2964. A. Thomson, Glasgow—Setting out rivet holes in boiler, &c., plates.

Dated 24th January, 1854.

174. A. W. Sleigh, 1, Weymouth street, Portland place—Motive power.
176. J. B. Moinier, La Villette, Paris—Sulphates, nitrates, and acids.

Dated 28th January, 1854.

209. J. J. L. Fournier, Montpellier, France—Alcohol.
211. M. T. Raymond, 25, Clement's lane—Retarding, &c., railway carriages.
213. W. Williams, Cheapside—Heating the heaters of box irons.
215. D. Bethune, Toronto—Steam vessels.
217. W. Woolford, Bradford—Moreens.

Dated 30th January, 1854.

219. P. A. Le Comte de Fontaine Moreau, 4, South street, Finsbury—Railway accidents. (A communication.)
221. H. J. Iliffe, and N. Brough, Birmingham—Buttons.
223. W. Hodgson, Wakefield—Looped fabrics.
225. J. R. Cooper, Birmingham—Rolls for gun barrels, &c.
227. J. Kershaw, Dublin—Steam engines.
229. R. Chapman, Eaton, Norwich—Feed to mill stones.

Dated 31st January, 1854.

231. A. M. Fatio and F. Verdeil, Paris—Preserving substances.
233. T. Hollingsworth, Nottingham—Tags to laces.
235. C. Erckmann, La Villette, Paris—Telegraphic wires.
237. R. Oliver, R. Barlow, and J. Blundell, Manchester—Patterns for textile fabrics.
239. L. C. Koeffler, Rochdale—Scouring, &c., wool for spinning.
241. P. J. Meeus, Paris—Metallic surfaces.
243. R. A. Brooman, 166, Fleet street—Steel. (A communication.)
245. J. Jackson, Broad street, Golden square, and G. M. Hantler, Sloane street—Baths.

Dated 1st February, 1854.

247. H. Wickens, 4, Tokenhouse yard—Intercommunication in railway trains.
249. J. Buchanan, Leamington Priors—Propellers.
251. W. Guest, Lion square, Sneinton—Whips, braids, and wire nets.
253. A. Robinson, 9, Whitehall place—Compositions for coating ships' bottoms, &c.
255. J. Jobson, Derby, and R. Jobson, Dudley—Moulds for casting.
257. J. Hargreaves and J. Fletcher, Facit, Rochdale—Preparing cotton, &c., for spinning.
259. J. Beattie, Lawn place, Lambeth—Furnaces.

Dated 2nd February, 1854.

261. A. Mohler, Obernay—Lubricating machinery.
263. C. E. Paris, Paris—Metallic covering to metal surfaces.
265. J. H. Glassford, Glasgow—Lithographic and zincographic printing.

Dated 3rd February, 1854.

268. A. E. L. Bellford, 16, Castle street, Holborn—"Atmospheric post." (A communication.)
270. R. B. Newhouse, Uckfield—Gases of combustion in open fireplaces.
272. Marquis of Montebello, Mareuil-sur-Ay, France—Propeller.
274. E. Howard and D. P. Davis, Massachusetts, U. S.—Sewing machinery. (A communication.)

Dated 4th February, 1854.

276. W. Gosling, 4, Edward street, Woolwich—Railway danger signal.
278. A. V. Newton, 66, Chancery lane—Carriage springs. (A communication.)
280. W. Little, Strand—Distilling, &c., bituminous substances.
282. E. Cole, Hemming's row—Travelling bags.

Dated 6th February, 1854.

284. D. Deyres, 16, Bateman buildings, Soho square—Drilling.
288. T. and W. Hemsley, Melbourne, Derby—Looped fabrics.
290. A. Duncan, Glen house, Denny—Bleaching.
292. P. Trumble, Huddersfield—Paper-hangings.

Dated 7th February, 1854.

294. J. Murdock, 7, Staple inn—Paper. (A communication.)
296. E. Poitiers, Maldon terrace, Haverstock hill—New material as a substitute for hemp and flax.
298. W. J. Curtis, 23, Birchin lane—Railway signal.
300. A. F. D. Duvillier, 10, Rue du Bouloi, Paris—Remontoirs.
302. J. Taylor and J. Brown, Carlisle, and J. Brown, Oxford street—Charring substances.
304. A. V. Newton, 66, Chancery lane—Heckling flax, &c. (A communication.)
306. E. T. Rees, Prospect place, Swindon—Pressure slide valves.

APPLICATION WITH COMPLETE SPECIFICATION FILED.

319. J. Taggart, Massachusetts, U.S.—Machine for excavating earth. 9th February, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed February 16th, 1854.

1916. John Atherton, of Preston, and James Abbott, of Accrington—Improvements in and applicable to machines for winding yarn or thread, called "winding machines," used in the manufacture of cotton and other fibrous substances.
1917. Peter Foxcroft, of Salford—Improvements in machinery or apparatus for "doubling" cotton and other fibrous materials.
1918. George Richardson, of the Eastern Counties Railway, Shoreditch—Improvements in railway signals, and in the means of preventing accidents upon railways, and in the apparatus connected therewith.

Sealed February 17th, 1854.

1923. Félix Alexandre Victor Delarbre, of No. 9, Broad street Buildings—Improvements in treating fibrous substances.
1924. Thomas Clark Ogden and William Gibson, both of Manchester—Improvements in machinery or apparatus for preparing, doubling, and twisting cotton and other fibrous materials.
1926. Thomas Grimsley, of Oxford—Improvements in machinery for the manufacture of bricks, tiles, pipes, and pottery.
2032. Augustino Carosio, of Genoa—Improvements in obtaining power by the aid of an electric current for motive and telegraphic purposes.
2886. Thomas Hollinsworth, of Winwick, near Warrington—Improvements in the method of applying "breaks" to carriages employed upon railways, and in the machinery or apparatus connected therewith.
2962. James Burrows, of Haigh Foundry, near Wigan—Improvements in the formation of such metallic plates as are required to be conjoined by rivetting or other similar fastening.

Sealed February 18th, 1854.

1930. David Chalmers, of Manchester—Improvements in machinery or apparatus for cutting the pile of woven fabrics.
1932. Alexis Pigé, of Greek street, Soho—Improvements in locks and their keys. (A communication.)
1937. William Cornelius, of Panton street, Haymarket—Improvements in gilding porcelain, glass, and such like materials.
1938. Auguste Mathieu Maurice de Bergevin, of Paris—Improvements in the manufacture of coke, and in the apparatus connected therewith, and in treating the products obtained therefrom. (A communication.)

Sealed February 20th, 1854.

1944. James Kimberley, of Birmingham—Improvement or improvements in raising and lowering various kinds of window blinds, and in opening and closing window and other curtains, applicable also to the raising and lowering, or winding and unwinding, of maps and other sheets or articles, and to the closing of doors.
1968. George Culverhouse, of 72, English street, Hull—Improvements in manufacturing compost or manure.
2038. Albert Nagles, of Ghent—Improvements in machinery or apparatus for washing, bleaching, dunging, and dyeing woven fabrics.
2227. Jean Alexandre Labat, junior, of Bordeaux—Improved system of stoppering vessels and bottles.
2690. Moses Poole, of Avenue road, Regent's park—Improvements in breach-loading fire-arms, and in cartridges for use with such arms. (A communication.)
2751. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in rotary engines: (A communication.
2752. Charles Calixte André Grenier, of Paris—Improvements in the preparation of paints for buildings and other uses.
2794. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in machinery for manufacturing horse shoes. (A communication.)
2841. Lewis Harvey Bates, of Bradford—Improvements in machinery for stamping and cutting metal nuts and other similar metal articles.
2871. William Schaeffer, of Stanhope terrace—Improvements in purifying spirit.
2901. John Wibberley, of Eagley, near Bolton—Improvements in machinery or apparatus for winding yarns or threads on to spools or bobbins.
2930. Samuel Smith, of Horton Dye Works, near Bradford—Improvements in preparing rovings and yarns of wool.
2931. Alexander Parkes, of Birmingham—Improvements in seperating silver from its ores or other compounds.
2940. Caleb Bedells, of Leicester—Improvements in the manufacture of elastic fabrics.
2960. Emile Victor Felix Lemaire, of 2, Rue Drouot, Paris—Improvements in tanning.

Sealed February 22nd, 1854.

1954. Victor Emile Warmont, of Neuilly—Improvements in dyeing and ornamenting skins, fabrics, and other substances.
1964. William Mann, of Stepney—Improvements in the purification of gas, and in the treatment of the material used in such purification.
1978. John Shaw, of Manchester, and Joseph Steinthal, of the same place—Improved manufacture of artificial manure.
2003. Peter Armand le Comte de Fontaine Moreau, of South street, Finsbury—Certain improvements in the production of electricity. (A communication.)
2125. John Wakefield, and James Baskerville, both of Inchicore Works, Dublin—Improvements in, and applicable to, valves for reciprocating engines driven by steam or other elastic fluid.
2153. William Shelbourne Icely, of Bromley, Middlesex—Improvements in mechanical telegraghs.
2381. Charles Joseph Louis Cloux, jun., Paris—Invention of a process for the preparation of hemp, after the stripping.
2385. Antoine Corvi, of Paris—Improvements to stationary and portable organs with keys and cylinders.
2420. André Alexandre Beaumont, of Paris—Invention of a system of production of caloric, with or without combustible material.
2542. Benjamin Butterworth, of Caldershaw, near Rochdale—Improvements in combining oil with other liquids for the obtainment of a new lubricating compound. (Partly a communication.)
2733. Hugh Mason, of Ashton under-Lyne, and John Jones, of Manchester—Improvements in machinery or apparatus for doubling, twisting and spooling woollen, cotton, and other yarns.
2782. John Elce, of Manchester—Certain improvements in machinery for spinning.
2840. William Salter and Robert Halliwell, both of Bolton le Moors—Improvements in machinery for spinning.
2878. Charles Coates, of Sunnyside—Improvements in and applicable to looms for weaving.
2919. William Binnion, of Birmingham—Improvements in carriage and other lamps.
2921. William Tranter, of Birmingham—Certain improvements in fire-arms, and in bullets and waddings to be used therewith.
2963. James Burrows, of Haigh Foundry, near Wigan—Certain Improvements in the construction of steam boilers or generators, and in the arrangement of furnaces connected therewith.
3004. James Taylor, of the Britannia works, Birkenhead—Certain improvements in raising and lowering weights.
3016. Mary Philips, of Birmingham—Improvement or improvements in metallic revolving or winding shutters. (A communication.)
3017. Amédée François Rémond, of Birmingham—New or improved metallic tubes.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854. Feb. 16.	3564	Church Hassock or Footstool	Stephen Plummer	Factory, back of the Post-office, Upper Holloway.
" 17.	3565	Marine Safety Lanthorn	John Willcox	Kingston-upon-Hull.
" 18.	3566	The Ragland Surtout	Thomas Geoghegan	94, Germyn street, St. James's.
" 20.	3567	Fagan's Universal Linen Marker............	Michael Fagan	Paradise street, Sheffield.
" 21.	3568	Tooth Brush Guard	Gay and Son............	113, High Holborn.

Journal of the Society of Arts.

FRIDAY, MARCH 3, 1854.

NOTICE TO INSTITUTIONS.

The Council have much pleasure in informing Institutions in Union, that Her Majesty's Treasury has, at their instance, ordered copies of the Report on the "Organisation of the Permanent Civil Service," by Sir Stafford Northcote and Sir C. E. Trevelyan, to be forwarded to those Institutions.

INTRODUCTION OF SILKWORMS FROM ASSAM INTO MALTA AND ITALY.

According to an account given by Mr. Thomas Hugon in the *Journal of the Asiatic Society of Bengal*, there appear to be different descriptions of worms found in Assam, which the natives have been long in the habit of rearing for the sake of the silk they afford, viz., the *Bombyx mori*, the well known mulberry worm; the *eria*, the *mooga*, the *kontkuri*, the *deo mooga*, and the *haumpottonee*, all of which are described and treated of by Mr. Hugon. The five last are indigenous, but the first, though it has been long introduced into the country, is supposed to have been brought with the mulberry tree from Bengal. The *Eria* (*Bombyx Cynthia*, or *Phalæna Cynthia*), the worm referred to in Colonel Sir William Reid's letter as lately brought to Malta by Mr. Piddington, with a view to its introduction into Italy, is stated by Mr. Hugon to differ from the mulberry worm and moth in many respects, though, "like it, however, it goes through four different moultings, but its sickness in doing it lasts only twenty-four hours; the last stage takes eight days, the others four. The duration of its life varies according to seasons: in summer it is shorter, and the produce both greater and better; at this season, from its birth to the time it begins its cocoon, twenty to twenty-four days expire, in fifteen more the moth comes forth, the eggs are laid in three days, and in five they are hatched, making the total duration of a breed forty-three to forty-seven days: in winter it is nearly two months. The number of breeds in the year are reckoned at seven.

"This worm is, like the mulberry worm, reared entirely within doors: it is fed principally on the *hera* or palma-christi (*Ricinus communis*) leaves; it eats the mulberry leaf also, but is said to prefer the former. When the palma-christi leaves fail, they are also fed on those of several other trees known in this part of Assam by the following names:—1. Kossool. 2. Hindoo gass. 3. Meekeerdal. 4. Okonnee. 5. Gomarree. 6. Litta Pakoree. 7. Borzonolly.

"The worms thrive best and produce most when entirely fed on the palma-christi: it is the only plant which is cultivated purposely for it. There is hardly one ryut who has not a small patch of it near his house or on the hedges of his fields. It requires little or no culture; the ground is turned up a little with the hoe and the seeds thrown in without ploughing: whilst the plant is young it is weeded once or twice, but it is afterwards left to itself. The plant is renewed every three years. On the leaves of Nos. 1 and 2, worms can be reared entirely, but they do not thrive well upon it; many die even after having begun the cocoons, and the few of these that are got are small and yield but little. These and the others are only used in the fourth or fifth stage, when they are considered to answer quite as well as the palma-christi leaves. The *kossool* (No. 1) alone can be given alternately with the palma-christi. The whole of these trees are found in the forests, but not cultivated.

"To breed from, the Assamese select cocoons from those which have been begun in the largest number on the same day—generally the second or third day after cocoons have begun to be formed—those that contain males being distinguished by a more pointed end. These cocoons are put in a closed basket, and hung up in the house out of reach of rats and insects. When the moths come forth they are allowed to move about in the basket for twenty-four hours; after which the females (known only by the larger bodies) are tied to long reeds or canes, twenty or twenty-five to each, and these are hung up in the house. The eggs that have been laid the first three days, amounting to about two hundred, are alone kept; they are tied in a piece of cloth, and suspended to the roof until a few begin to hatch; these eggs are white, and the size of turnip seed. When a few of the worms are hatched, the cloths are put on small bamboo platters hung up in the house, in which they are fed with tender leaves. After the second moulting they are removed to bunches of leaves suspended above the ground; under them, upon the ground, a mat is laid to receive them when they fall; when they have ceased feeding they are thrown into baskets full of dry leaves, amongst which they form their cocoons, two or three being often found joined together.

"The caterpillar is at first about a quarter of an inch in length, and appears nearly black; as it increases in size it becomes of an orange colour, with six black spots on each of the twelve rings which form its body. The head, claws, and holders are black. After the second moulting they change to an orange colour, that of the body gradually becomes lighter, in some approaching to white, in others to green, and the black spots gradually become the colour of the body. After the fourth and last moulting, the colour is a dirty white or a dark green; the white caterpillars invariably spin red silk, the green ones white. On attaining its full size the worm is about three and a half inches long. Unlike the *mooga* caterpillar, its colours are uniform and dull, the breathing holes are marked by a black mark; the moles have become the colour of the body, they have increased to long fleshy points, without the sharp prickles the *mooga* worm has; the body has a few short hairs, hardly perceptible.

"In four days the cocoons are complete; after the selection for the next breed is made, they are exposed to the sun for two or three days to destroy the vitality of the chrysalis. The hill tribes settled in the plains are very fond of eating the chrysalis—they perforate the cocoons the third day to get them; they do the same with the *mooga*, and sell few cocoons imperforated.

"The cocoons are put over a slow fire in a solution of potash, when the silk comes easily off; they are taken out and the water slightly pressed out: they are taken then one by one, loosened at one end, and the cocoon put over the thumb of the left hand, with the right they draw it out nearly the thickness of twine, reducing any inequality by rubbing it between the index and thumb; in this way new cocoons are joined on. The thread is allowed to accumulate in heaps of a quarter of a seer: it is afterwards exposed to the sun or near the fire to dry; it is then made into skeins, with two sticks tied at one end, and opening like a pair of compasses: it is then ready to be wove, unless it has to be dyed."

After describing the process of dying the silk, Mr. Hugon goes on to say:—

"The thread is wove as cotton. The different prices of the cloths and their use will be found in an annexed table; their cloths are mostly used for house consumption, a few are bartered with the Bhotias and other hill tribes. Large quantities were formerly exported to Lassa by merchants, known in Derung as the 'Kampa Bhotias;' the quantity they used to take away was very considerable, but in the latter year of the Assam rajah's rule, from the disorganised state of the country, the number of merchants gradually decreased. Three years ago only two came, after a long interval; one of them died, and

I believe the trade has not again been revived: those two merchants complained that they could no more procure the cloths suited to their markets. No exports of it are mentioned in the returns of the Hydra chowkey. The quantity the country is capable of exporting under an improved management would be very large, for it forms at present the dress of the poorer classes at all seasons, and is used by the highest for winter wear.

"I have been unable yet to ascertain the quantity of this silk obtainable from one acre of land; no man can tell me the extent of his plantation, or even the quantity of Eria thread he got in a year beyond this, that he had enough for the use of his family. Every ryut has a few plants round his house or farming hedges, which would at most amount to the twentieth part of an acre; so that for this to afford clothing for a family the produce must be very large indeed."

* * * * * * *

"Little *eria* is exported, but the *mooga* forms one of the principal exports of Assam; the average of the quantity passed at Gowalpara during the two last years that duties were levied, was two hundred and fifty-seven maunds, valued at fifty-six thousand and fifty-four rupees; it leaves the country principally in the shape of thread. Most of it going to Berhampoor, it is probable that the cloths made from it pass under the name of *tussur;* the latter, as far as I recollect, appears to have less gloss. The Hydra chowkey returns comprise only the products exported by water. The total quantity that leaves the province may, I think, be estimated at upwards of three hundred maunds, for *mooga* forms also a portion of the traffic with Silhet (across the hills), the Cassyas, Bhotias, and other hill tribes. The Assamese generally keeping more for their own use than they sell, the total quantity produced in the province may be reckoned at six or seven hundred maunds. It has been in great demand in Bengal, for within the last few years, although the production has been greater from the more settled state of the country, the price has risen 20 per cent. When I first arrived in this district, it could be obtained without difficulty from the ryuts, at three-and-a-half to four rupees the seer; now it is difficult to procure it at five rupees. The competition is so great, that the traders pay for it in advance, not, as with other products, to get it at a lower rate, but merely to secure their getting it. This competition is also owing to the greater number of small traders who resort to the province since the abolition of chowkeys, which may have caused a rise on the price of the product in Assam without a corresponding increase in the exports.

"No gradual improvement can be traced in the mode of rearing the several worms or winding their silk—it is now what it was a century ago, there being no European speculators in Assam, nor it being probable that when any venture so far they would readily risk the capital in quite a new branch of industry. This important product of the country is likely to remain for years unimproved, unless the subject should again be taken up by Government. The small factory set up by the late Mr. Scott, to which I have before alluded, was kept up too short a time to have had any perceptible effect. Mr. Scott's declining health and numerous duties never allowed him to give it a moment's personal attention, nor could his assistant do it, having then the same work to do which now employs several officers; the factory was therefore left entirely under the direction of natives. These, to add to their own importance, rather increased than alleviated the fears that the Assamese (who had laboured under so many restrictions) naturally entertained of imitating or using any thing pertaining or appropriated to the 'Raja,' such a presumption in the good old times might have cost a man his ears or his nose. The residence of European officers in different parts of the country having undeceived the people as to those restrictions, there would be now great facilities in introducing improvements; although the ryuts individually have not the means of getting reeling machines, however simple and cheap, they would, as with sugar-mills, club together to obtain them, were it only shown to them that there was any advantage in the use of them. Mooga thread is every day increasing in value; I have marked its rise from three rupees eight annas, to five rupees, in the short space of three years; in Gowalpara it sells at six rupees eight annas, or seven rupees; in Dacca and Moorshedabad at eight rupees. This is, I believe, not more than 30 per cent. below mulberry silk in Calcutta. The primitive process of the Assamese which I have described will, perhaps, show a possibility of this difference being made up by superior management. The Mooga silk could be used in coloured fabrics, being easily dyed. In its natural fawn-colour it stands washing much better than silk, keeping gloss and colour to the last; the natives bleach it with a solution of the potash made from plantain trees; this they also use in washing their cloths, both cotton and silk: soap was unknown previous to the British occupation of the country.

"Another object of great interest, which might become of great importance to this province, is to ascertain the possibility of rendering the *eria* marketable in some shape or other. The way of preparing it (already described) is such that the cloth made of it, when new, looks as rough as "taut" (or gunny); it is only by repeated washings that it attains a softness of feel and gloss which approach that of silk. It is highly improbable that amongst the natives repeated trials should not have been made of reeling, instead of spinning these cocoons; but, from their failing, it would be wrong to lay it down as an impossibility; they have merely tried it as other cocoons, and given it up when they found that the fibre "did not come," as one of them told me. I had it tried before me with a few cocoons, but with the greatest care the fibre could not be drawn off beyond a few yards without breaking. The cause of this appeared to me to be a greater adhesiveness in the fibre than with other cocoons. It was drawn off with difficulty, and with a crackling noise, until it brought several layers with it, from which it could not be detached without breaking; something may perhaps be hereafter found to reduce that adhesiveness. It is, I think, unlikely that the worm should spin in a different way from all others; allowing this to be the case, great improvements could be made in the spinning, by, no doubt, the introduction of the process in practice in Europe to spin perforated cocoons; from its cheapness it would perhaps be advantageously used with wool—especially in stockings. It would add softness and gloss without taking from the warmth, the cocoons costing only one rupee, the thread two rupees per seer.

"Although I have been unable to form an estimate of the land taken up on the cultivation of the "*hera*" or palma-christi, a very rough one could be made of the total quantity of *eria* silk produced by referring to the population; it being the daily wear of the poor, and, besides, being used by every class in winter. The population is reckoned at 455,000, therefore, estimating the yearly consumption of each individual at the lowest, the total quantity produced would be upwards of 1000 maunds. Most of this could be exported if it acquired the least additional value, by better management, and be replaced by other manufactures and by an increase in the growth of cotton. The product would keep pace with any increase of demand, for there is hardly a house in the country where these worms are not reared."

In a memorandum upon the specimens of silk and silkworm from Assam, by W. Prinsep, Esq., given in the same journal, the *eria* is thus spoken of:—

"The *eria* cocoon, thread, and cloth are all new to us; I have never seen them in Bengal, except now and then a few pieces of the cloth imported from Rungpur. It appears to be more cottony than the tussur, and to make a web warmer and softer than the tussur cloth, but it is not so strong."

Table annexed to Mr. Hugon's paper, and there referred to:—

List of the Cloths made in Assam of Mooga and Eria Silks.

Names of Cloth.	Size in Cubits.	Weight.		Price of Thread.	Cost of weaving.	Total.	Remarks.
		Seer	Chk	R. A. P.	R. A. P.	R. A. P.	
Mooga.							
Soorias ...	7 by 1½	0	6	1 14 0	0 3 0	2 1 0	} Dhoties.
Ditto	16 „ 2	1	0	5 0 0	0 8 0	5 8 0	} Dhoties.
Mekla	5 „ 1½	0	4	1 4 0	0 2 0	1 6 0	Petticoats.
Rhia	12 „ 1½	0	8	2 8 0	0 4 0	2 12 0	Scarfs.
Gaursha ..	8 „ 1	0	2	0 10 0	0 1 0	0 11 0	Worn as turbans, or round the waist.
Joonta Bor Cappor	12 „ 2½	1	0	2 0 0	0 6 0	2 6 0	Made of the floss, and worn in winter.
Eria.							
BorCappor	16 „ 3	1	8	3 0 0	0 8 0	3 8 0	Worn in winter, & used as a blanket; also made into coats.
Meklas	5 „ 2	0	6	0 12 0	0 2 0	0 14 0	} Used only by the poorer classes.
Rhia	10 „ 1½	0	8	1 0 0	0 2 0	1 2 0	} Used only by the poorer classes.
Gaursha ...	8 „ ½	0	4	0 8 0	0 2 0	0 10 0	} Used only by the poorer classes.

Dr. Helfer, in a paper read before the Asiatic Society and published in their journal, in speaking of the variety of indigenous silkworms in India, thus notices the *Eria*:—"It is reared over a great part of Hindostan, but more extensively in the districts of Dinajpur and Rangpur, in houses, in a domesticated state, and feeds chiefly on the leaves of *Ricinus communis*.

"The silk of this species has hitherto never been wound off, but people were obliged to spin it like cotton.

"'It gives a cloth of seemingly loose coarse texture, but of incredible durability; the life of one person being seldom sufficient to wear out a garment made of it, so that the same piece descends from mother to daughter.'—*Atkinson's Letter to Roxburgh.*

"It is so productive as to give sometimes 12 broods of spun silk in the course of the year. The worm grows rapidly, and offers no difficulty whatever for an extensive speculation.

"On account of the double profit which would be derived from the same area of land cultivating it with castor-oil plant, which produces oil and feeds the worm, an extensive cultivation of this species would be highly recommendable; and if also the cloth is of the coarsest nature, it is, on the other hand, very valuable on account of its durability. May it not be particularly well adapted to mix it in certain textures with cotton?

"It is likewise an inhabitant of Assam, and Mr. Hugon's observations about this species form an interesting paragraph in his memorandum."

Dr. Helfer estimates that there are not less than 150 species of moths in India which form cocoons, more or less adapted for use in manufactures. He adds—"Many have made the objection that the silk of the Indian species is much inferior.

"This is yet an undecided question. The mulberry silkworm degenerates if not properly attended to. What has been done to raise the indigenous species from the state of their natural inferiority? Very much depends upon the cultivation of the worms in houses; 2, the method of feeding them, selecting that vegetable substance, not which gratifies the best their taste, but which contributes to form a finer cocoon; and 3, from the first chemical operations employed before the working of the rough material. But even if the raw material would not be capable of a higher degree of cultivation, the demand for it would, notwithstanding, never cease in Europe. All silk produced in Hindostan has hitherto found a ready and profitable market in Calcutta, and the demand is always greater than the supply; and that really the roughest stuff of the Arrindy silkworm is appreciated in England, may I be permitted to conclude the present article with the following fact:—

"Mr. John Glass, the surgeon of Baglipur, sent, in the beginning of this century, some of the Arrindy silk home, and he wrote:—

"'I understand that some manufacturers to whom it was shown seemed to think that we had been deceiving them by our accounts of the shawls being made from the wool of a goat, and that this silk if sent home would be made into shawls equal to any manufactured in India.'

"This will be sufficient to show the importance of this article, and that it merits highly the attention of the paternal Government of India, and of all patriotic institutions, particularly of the Asiatic Society in Calcutta, which has done hitherto so much for the promotion of science and knowledge, and consequently for the welfare of all nations."

ASSIMILATION OF THE COMMERCIAL AND BANKRUPTCY LAWS OF ENGLAND AND SCOTLAND.

A meeting of the merchants and manufacturers of Leeds, called by the Chamber of Commerce, was held in the Court-house of Leeds, on Thursday last, to hear a paper "On the Currency Laws," read by Edward Wurtzburg, Esq.; and to hear an address by John Gilmour, Esq., barrister-at-law, of London, "on the assimilation of the commercial and bankruptcy laws of the United Kingdom." The Mayor (John Wilson, Esq.,) presided.

Mr. Gilmour said,—The committee of London merchants, on whose behalf I have the honour to address this important and influential meeting, consists of many of the leading merchants of the metropolis trading with Scotland. The object they seek to attain is a uniform and improved code of commercial and bankruptcy law for the United Kingdom. In many of the departments of mercantile jurisprudence, the law of England differs more materially in principle and practice from that of Scotland than it does from any other commercial nation. For instance, a sale of goods valid in England would not be an effectual transaction if entered into on the other side of the Tweed. In Scotland, even though the price be paid, delivery is requisite to perfect the contract. In England, the law is not so. One result of this conflict is, that on the bankruptcy of the seller in Scotland, with the goods still in his possession, such goods form the assets for division among the creditors,—whereas in England, the property in that case would belong to the purchaser, subject to a lien for the unpaid price. The warranty in the sale of goods is likewise different in the two countries. In Scotland there is an implied warranty by the seller that the goods sold shall be free of latent defects, and fit for the purpose for which they are sold; whereas in England there is no such implied warranty in the law. A case of great hardship, arising out of this conflict in the law, occurred not long ago within my own knowledge, where a seedsman in Scotland purchased turnip-seed of an English grower. The seed became heated while under preparation, unknown to the grower. It was sold by the Scotch seedsman to his customers, and did not grow. The unfortunate seedsman was compelled to pay damages to his customers, and by reason of this difference in the law of warranty on the two sides of the River Tweed, he had no remedy against the English grower. Similar discrepancies in the law of sale occur with regard to the question of lien—to stoppage in transitu—to the evidence of the sale in a court of justice,—to the statutes of limitations, which differ essentially in the two countries, and to a variety of other points bearing upon the sale of goods, all deeply affecting the nature and security of mercantile dealings. In partnership, the law with regard to the rights of creditors differs materially in the two countries. In Scotland, the creditors of the partnership are entitled to prove first on the part-

nership estate, and then to claim for the balance *pari passu* with the private creditors, on the private estate of the partners; whereas in England the partnership assets are divided among the partnership creditors, and the private assets amongst the private creditors of the partners, to the exclusion of the creditors of the partnership. When it is considered how many mercantile houses have establishments both in England and Scotland, and the number is daily increasing, questions must, and do constantly arise, of the most preplexing character. Suppose that the Scotch seedsman had had an establishment in England and I am not sure that he had not, and that the seeds had been forwarded from his warehouse in England, to his Scotch customers, I do not venture to say whether the English or Scottish law of warranty would have regulated the matter, but I am quite sure of this, that it would have raised a very nice question for the lawyers. In the administration of bankruptcy and insolvency the two systems differ in a very eminent degree, so much so, that the plan of winding up a bankrupt estate on the one side of the Tweed is almost unintelligible to the merchants and lawyers on the other. In England there is perhaps too much of judicial control—in Scotland, certainly too little. In the Scottish system there is too much of secrecy,—in England, perhaps too much of publicity. Very great abuses have risen under both systems, which require to be remedied, and those on whose behalf I have the honour to appear before you, have formed a very decided opinion that the time has now arrived when one uniform and improved system of admistering bankrupt and insolvent estates should be established for the United Kingdom. The method of procedure for the recovery of debts in the two countries differs essentially, especially upon bills of exchange. In Scotland, the law holds a man's signature to a bill of exchange, to be a warrant of attorney to sign judgment against him in the event of his not paying when the bill becomes due, whereas in England the holder of a bill of exchange is in no better position than if his claim stood upon an open account for goods sold and delivered. Then, with respect to issuing excution upon judgments, there is a mischievous defect common to both systems. When a debtor against whom a judgment has been pronounced in England or Scotland, removes to either country, the creditor is obliged to follow him thither, and not only to commence proceedings *de novo*, but to find security for his debtor's costs. These conflicts and discrepancies in the principles and practices of commercial and bankruptcy law in the two divisions of the island, give rise to great inconvenience and perplexity. When questions arise out of them in which the English or Scottish merchant requires to take proceedings on the other side of the border, he is altogether at a loss, and it is more than probable that his own legal adviser is unable to direct him. Nor is it to be expected that he should, because not only the law itself is conflicting, but the technical language of the law in England and Scotland is so different, that even professional men in the two countries experience great difficulty in understanding the nomenclature of each other. It was for these reasons that the merchants of London whom I have the honour to represent, associated together more than two years ago, for the improvement of the commercial and bankruptcy laws of England and Scotland, and the assimilation of those laws throughout the United Kingdom. There are now associated with them for the purpose of carrying out this great object, influential committees in Glasgow, Paisley, Dundee, Aberdeen, Carlisle, and Liverpool. A deputation from the London Committee consisting of Mr. John Porter Foster, of the firm of Foster, Porter, and Co., of London, and Mr. James R. Jeffery, of the well-known house of Jeffery, Morrish, and Co., of Liverpool, is now in Manchester, for the purpose of organizing an influential committee in that city, and they are desirous to have a similar committee established in Leeds. The Society for the Amendment of the Law, which is presided over by Lord Brougham, and embraces within its membership many of the most eminent statesmen, judges, merchants, and lawyers of the day, lent their valuable aid in co-operation with the London committee of merchants, and summoned a conference of delegates from the different commercial bodies in the United Kingdom to consider the propriety of assimilating the law in the three kingdoms, which was held in London on 16th November, 1852. At that conference, in which Leeds was most ably represented by the Right Honourable M. T. Baines, M.P., and Sir Geo. Goodman, M.P., its two representatives in parliament, resolutions were passed highly approving of the principle of assimilation. Immediately after these resolutions were passed, the London Committee of merchants proceeded with great vigour to carry the principle of assimilation into practical effect.—After carefully collecting information on the subject, the committee prepared a bill to improve the administration of bankruptcy and insolvency in Scotland. In that bill, the principle of assimilation was studiously carried out, borrowing the best parts of each system, and discarding whatever was defective in either. The principle established throughout the provisions of this bill, is local judicial control,—that is to say—that each mercantile community shall be enabled by a mode of procedure at once simple and effective to transact its bankruptcy and insolvency business on the spot, giving to the local judge original jurisdiction to deal with every question that can possibly arise in the winding up of a bankrupt or insolvent estate, without the interference of the superior courts. The bill was introduced into the House of Lords by Lord Brougham last session, and read a second time, and petitions were presented in favour of the bill from many mercantile constituencies in England and Scotland. I have already drawn your attention to the mode of recovering on dishonoured bills of exchange in Scotland, as a more speedy and economical process than that known in England. The subject has, already excited great interest in Liverpool and Manchester. from whence the question has been pressed on the attention of the London Committee; and I am quite sure that its introduction into England will have the unanimous approval and hearty support of the commercial public of Scotland, where the system has been satisfactorily tested by the daily experience of more than a century and a half. Before leaving this branch of the subject of assimilation I have further to state that at a general meeting of the Society for Promoting the Amendment of the Law, at which Lord Brougham presided, on Monday last, a report by a committee of that very learned body recommending the extension to England of the Scottish system of summary procedure on bills of exchange, was taken into consideration; and the meeting unanimously approved of the report, which report not only declared the introduction of the system into England to be desirable but pronounced it to be eminently practicable. I cannot but regard this as an important fact, because it is not only necessary to satisfy the legislature that any proposed measure is desirable, but that it is also practicable; and certainly no higher sanction could be obtained of its legal practicability than that of the Society for the Amendment of the Law. A bill has already been prepared for extending that cheap and speedy mode of recovering payment on bills of exchange, into this country. Lord Brougham has been urged by a large number of mercantile men to bring in the bill, and I understand there is good reason to hope that his lordship will be induced to lay it on the table of the Upper House in the course of a few days. With regard to the proposal that a judgment pronounced in England, Ireland, or Scotland, shall be of equal force and effect in either country by means of registration or indorsement, I have much satisfaction in informing the meeting, that a bill for this purpose is now in preparation, and will probably be brought into the House of Commons in the course of a few days by the honourable and learned member for the Ayr Burghs, Mr. Crauford, who is a member of the London Committee, and who so ably and manfully last session of parliament fought the battle of

cheap and speedy justice in the County Courts of Scotland. I have now stated to you as briefly as I could, consistently with the importance of the subject, some of the grievances felt from the conflicting laws of England and Scotland. I have submitted to you an outline of the remedies proposed which are now in the course of preparation: and I shall only add, that should a favourable opinion of the principle of assimilation, and of the method proposed for carrying it out, be pronounced on the present occasion by the highly important manufacturing and commercial community of Leeds, it will carry much influence with the legislature, and greatly strengthen the hands and encourage the efforts of the London Committee, and the other committees with whom they are associated, in promoting the great national object of a perfect assimilation of the commercial and bankruptcy laws of the United Kingdom.

Some discussion then ensued, when the following resolutions were unanimously passed:—

1. "That this meeting regards with great interest the important movement now going forward for the desirable object of an assimilation of the Mercantile and Bankruptcy Laws throughout the United Kingdom."

2. "That this meeting having heard the principles illustrated on which Lord Brougham's Bankruptcy Bill for Scotland is founded, and its leading features explained, is of opinion that this bill is the first and greatest step in the direction of assimilation that has yet been taken. That this meeting is further of opinion, that the measure, while assimilating the administration of the Bankruptcy law of Scotland in principle to that of England, introduces a variety of improvements on the latter system, by which it is rendered more simple and more economical, and that the adoption of this measure in Scotland will lead to important reforms in the administration of bankruptcy in this country. That this meeting, therefore, approves of the principle of the bill, reserving the details for consideration, and resolves to take all necessary steps in conjunction with Lord Brougham and the London Committee, and with the other Committees throughout England and Scotland, for having its provisions rendered as perfect as possible, and passed into law without delay."

3. "That this meeting having had under consideration the mode of recovering by summary diligence on dishonoured bills of exchange in Scotland, is of opinion, that the adoption of this system in England would be productive of great advantages to commerce, that the present mode of recovering by action is dilatory and inexpedient, and that looking at the nature and object of bills of exchange, the principles of justice and the interests of commerce require that the party who signs his name to such a security should not have the power of compelling the holder to have recourse to circuitous, expensive, and uncertain proceedings for the purpose of realising it. That the sum due on a bill of exchange being a constituted and ascertained debt, it is expedient that after proper notice to the party liable, its payment should be enforced by summary legal process, and that the sound principles of jurisprudence throw the burden both of the proceedings and the proof on the party who seeks to question its legal character and effect."

4. "That this meeting regards the present state of the law as defective and inexpedient by which, upon the removal of a debtor from England, Ireland, or Scotland, to either country, after judgment obtained, it should be imperative to commence an action *de novo*, and that the creditor should be compelled to find security for his debtor's costs; that a statutary provision, declaring that a judgment pronounced in England, Ireland, or Scotland, shall by a registration or endorsement be of equal force and effect in either country, would be a great boon to the mercantile community, and this meeting resolves to support any bill which shall be brought into Parliament for this purpose."

5. "That considering the success which has already attended the efforts of the London Committee of merchants, the zeal and ability with which they have pursued the cause of the assimilation of our mercantile laws, and the facilities which they possess of pressing their views on the Legislature, this meeting regards the London Committee as eminently qualified to advance this important reform, and hereby expresses its confidence in them, and its willingness to co-operate with the London Committee, and with the other Committees associated with them throughout the United Kingdom, and to render the London Committee every aid and assistance in its power."

6. "That this meeting recommends the Chamber of Commerce to appoint a Committee, with power to add to their number, for the purpose of communicating and co-operating with the London Committee of merchants, and the local Committees already appointed, and to be appointed in other towns, with a view of carrying out these important objects."

NEW YORK INDUSTRIAL EXHIBITION.

Special Report of Mr. Joseph Whitworth. (a)

In the introduction to this Report, Mr. Whitworth states that he was prevented, by unavoidable circumstances, from making a report upon the machinery exhibited in the New York Industrial Exhibition, and that he has therefore drawn up the results of observations made while visiting the principal seats of those manufactures which came within his department, and which it appeared desirable should be known to those engaged in mechanical and industrial pursuits in this country.

In doing this he says

"I could not fail to be impressed, from all that I saw there, with the extraordinary energy of the people, and their peculiar aptitude in availing themselves to the utmost of the immense natural resources of the country.

"The details which I have collected in this report show, by numerous examples, that they leave no means untried to effect what they think it is possible to accomplish, and they have been signally successful in combining large practical results with great economy in the methods by which these results are secured.

"The labouring classes are comparatively few in number, but this is counterbalanced by, and indeed may be regarded as one of the chief causes of, the eagerness with which they call in the aid of machinery in almost every department of industry. Wherever it can be introduced as a substitute for manual labour, it is universally and willingly resorted to; of this the facts stated in my report contain many conclusive proofs, but I may here specially refer, as examples, to plough-making, where eight men are able to finish thirty per day; to door-making, where twenty men make 100 panelled doors per day; to last-making, the process of which is completed in 1½ minutes; to sewing by machinery, where one woman does the work of 20; to net-making, where one woman does the work of 100. It is this condition of the labour market, and this eager resort to machinery wherever it can be applied, to which, under the guidance of superior education and intelligence, the remarkable prosperity of the United States is mainly due. That prosperity is frequently attributed to the possession of a soil of great natural fertility, and it is doubtless true that in certain districts the alluvial deposits are rich and the land fruitful to an extraordinary degree; but while traversing many hundred miles of country in the Northern States, I was impressed with the conviction that the general character of the soil there was the reverse of fertile.

"It is not for a moment denied that the natural resources of the United States are immense, that the products of the soil seem capable of being multiplied and varied to almost any extent, and that the supplies of minerals appear to be nearly unlimited.

"The material welfare of the country, however, is largely dependent upon the means adopted for turning its natural resources to the best account, at the same time that the calls made upon human labour are reduced as far as practicable.

"The attention paid to the working of wood, some details connected with which I have included in the report, is a striking illustration of this. The early settlers found in the forests which they had to clear an unlimited supply of material, which necessity compelled them to employ in every possible way, in the construction of their houses, their furniture, and domestic utensils, in their implements of labour, and in their log-paved roads.

(a) Presented to the House of Commons by command of Her Majesty, in pursuance of their Address of February 6, 1854.

"Wood thus became with them a universal material, and work-people being scarce, machinery was introduced as far as possible to supply the want of hands. The character thus given to one branch of manufactures has gradually extended to others. Applied to stone-dressing, for example, one man is enabled, as I have shown, to perform as much work as twenty masons by hand. So great again are the improvements effected in spinning machinery, that one man can attend to a mule containing 1,088 spindles, each spinning 3 hanks, or 3,264 hanks in the aggregate per day. In Hindoostan, where they still spin by hand, it would be extravagant to expect a spinner to accomplish one hank per day; so that in the United States we find the same amount of manual labour, by improved machinery, doing more than 3,000 times the work. But a still more striking comparison between hand and machine labour may be made in the case of lace-making in England. Lace of an ordinary figured pattern used to be made "on the cushion" by hand, at the rate of about three meshes per minute. At Nottingham, a machine attended by one person will now produce lace of a similar kind at the rate of about 24,000 meshes per minute; so that one person can, by the employment of a machine, produce 8,000 times as much work as one lace-maker by hand.

"The results which have been obtained in the United States, by the application of machinery wherever it has been practicable to manufactures, are rendered still more remarkable by the fact, that combinations to resist its introduction there are unheard of. The workmen hail with satisfaction all mechanical improvements, the importance and value of which, as releasing them from the drudgery of unskilled labour, they are enabled by education to understand and appreciate. With the comparatively superabundant supply of hands in this country, and therefore a proportionate difficulty in obtaining remunerative employment, the working classes have less sympathy with the progress of invention. Their condition is a less favourable one than that of their American brethren for forming a just and unprejudiced estimate of the influence which the introduction of machinery is calculated to exercise on their state and prospects. I cannot resist the conclusion, however, that the different views taken by our operatives and those of the United States upon this subject, are determined by other and powerful causes, besides those dependent on the supply of labour in the two countries. The principles which ought to regulate the relations between the employer and the employed, seem to be thoroughly understood and appreciated in the United States, and while the law of limited liability affords the most ample facilities for the investment of capital in business, the intelligent and educated artizan is left equally free to earn all that he can, by making the best use of his hands, without let or hindrance by his fellows.

"It may be that the working classes exhibit an unusual independence of manner, but the same feeling insures the due performance of what they consider to be their duty, with less supervision than is required where dependence is to be placed upon uneducated hands.

"It rarely happens that a workman who possesses peculiar skill in his craft is disqualified to take the responsible position of superintendent, by the want of education and general knowledge, as is frequently the case in this country. In every State in the Union, and particularly in the north, education is, by means of the common schools, placed within the reach of each individual, and all classes avail themselves of the opportunities afforded. The desire of knowledge so early implanted is greatly increased, while the facilities for diffusing it are amply provided through the instrumentality of an almost universal press. No taxation of any kind has been suffered to interfere with the free development of this powerful agent for promoting the intelligence of the people, and the consequence is, that where the humblest labourer can indulge in the luxury of his daily paper, everybody reads, and thought and intelligence penetrate through the lowest grades of society. The benefits which thus result from a liberal system of education and a cheap press to the working classes of the United States can hardly be over-estimated in a national point of view; but it is to the co-operation of both that they must undoubtedly be ascribed. For if, selecting a proof from among the European States, the condition of Prussia be considered, it will be found that the people of that country, as a body, have not made that progress which, from the great attention paid to the education of all classes, might have been anticipated; and this must certainly be ascribed to the restrictions laid upon the press, which have so materially impeded the general advancement of the people. Wherever education and an unrestricted press are allowed full scope to exercise their united influence, progress and improvement are the certain results, and among the many benefits which arise from their joint co-operation may be ranked most prominently the value which they teach men to place upon intelligent contrivance; the readiness with which they cause new improvements to be received, and the impulse which they thus unavoidably give to that inventive spirit which is gradually emancipating man from the rude forms of labour, and making what were regarded as the luxuries of one age to be looked upon in the next as the ordinary and necessary conditions of human existence."

The Report is divided into 12 chapters. The first treats of "steam-engines and machinery," and states that upwards of thirty establishments were visited at New York, Philadelphia, Baltimore, Pittsburgh, Buffalo, Boston, Lowell, Lawrence, Holyoke, Worcester, Hartford, and Springfield, employing, in the aggregate, from 6,000 to 7,000 men. In section 4, River Steamers for Shallow Waters, it is said that "a steam-boat running on the Ohio from Pittsburgh to Cincinnati, had a pair of direct acting engines with 32 inch cylinders and 8 feet stroke. There was no main crank shaft connecting the two paddle-wheels, but each engine worked its own wheel independently of the other. This arrangement enables the boat to be steered with greater facility round the sharp turns encountered in the tortuous course of the river. The framework and outer bearings of the paddle-wheels are supported by suspension rods, which are, as it were, slung over beams and framework strongly constructed and fixed in the centre of the vessel. The main deck is 280 feet long, and 58 feet wide. The paddles are 38 feet in diameter, having twenty-four floats, 12 feet wide by 28 inches in depth. For shallow rivers, flat-bottomed steamers propelled by a paddle-wheel at the stern are commonly used. Two were being built of iron in New York, drawing only 2¼ feet of water, which are intended for the passage across the isthmus of Panama by the Nicaragua route."

The propellers of steamers intended to run in shallow waters are made with four, and sometimes six blades each, and revolve with rather less than half their diameter immersed in the water.

The second chapter treats of the process of casting, cooling, &c., railway-wheels, and annealing—railroad spike making—nail and rivet making—cast steel works—engine tools; and the places visited were Pittsburgh, Philadelphia, Lawrence, and Worcester. "The iron castings in some of the establishments were very good, and cylinders from 8 to 14 feet in diameter were well bored, with a finishing feed of cut of about three-eighths of an inch per revolution, which is at a width of cut at least three times as great as that ordinarily given in English works. At Pittsburgh a large casting for a hydraulic press was cooled by the following method:—Water is introduced into the interior of the core by a pipe, which extends to the bottom, and fills it previous to casting. Provision is made for the escape of the air by making the core fluted. When the metal is poured into the mould it immediately heats the water, which is then drawn off by an escape pipe at the top of the core, and a supply of cold water is continually running in at the bot-

tom. Heat is thus gradually taken from the mass, and the whole cools uniformly. The casting was 10 inches thick, and weighed 7 tons. It took from three to four days in cooling. The best charcoal pig iron was selling in Pittsburgh at 45 dollars per ton, having risen within a short period from 30 dollars per ton." This iron required a force of 45,000 pounds to tear asunder a bar an inch square. In the process of 'pickling castings,' the diluted acid, consisting of 2½ parts of water to 1 of acid, is poured over the castings (instead of being immersed as in England) by hand from a long ladle, and when they are dry, the operation is repeated as often as necessary. The castings are afterwards cleansed by a powerful stream of water directed upon them from a hose pipe. In section 9, 'Annealing Railway Wheels,' it is said, "The leading and trailing wheels of locomotives, and railway carriage-wheels, are commonly hollow cast-iron disc wheels. The process of annealing adopted in a large manufactory in Philadelphia is as follows:—The wheels are taken from the moulds, as soon after they are cast as they can bear moving without changing their form, and before they have become strained while cooling. In this state they are put into a circular furnace or chamber, which has been previously heated to a temperature about as high as that of the wheels when taken from the mould; as soon as they are deposited in this furnace or chamber, the opening through which they are passed is covered, and the temperature of the furnace and its contents is gradually raised to a point a little below that at which fusion commences. All the avenues to and from the interior of the furnace are then closed, and the whole mass is left to cool gradually as the heat permeates through the exterior wall, which is composed of fire-brick 4½ inches thick, inclosed in a circular case of sheet iron ⅛ inch thick. By this process the wheel is raised to one temperature throughout before it begins to cool in the furnace, and, as the heat can only pass off through the medium of the wall, all parts of each wheel cool and contract simultaneously. The time required to cool a furnace full of wheels in this manner is about four days. By this process wheels of any form, and of almost any proportions, can be made with a solid nave." "In another establishment the wheels while hot are lifted from the mould, and the centre part is placed in a hole communicating by means of a flue with a high chimney, and the edge is packed round with sand. A draft is thus created which cools the mass of iron near the centre of the wheel, and in some measure prevents it from contracting unequally during the operation. At a foundry, in Worcester, the wheels when cast were taken hot from the moulds, and immersed in a pit of white sand, where they were left to cool gradually. In order to obtain the best chill, it is considered necessary to use cold blast iron made with charcoal." In a manufactory, at Pittsburgh, a machine was at work which made railroad spikes, each weighing half a pound, at the rate of 50 per minute; and in another establishment, 2000 kegs of nails, each weighing 100 lbs., and containing all sizes, from fourpenny up to tenpenny nails, are made in a week. A rivet-making machine was also at work, which made rivets, weighing seven to the pound, at the rate of 80 per minute.

In the Third Chapter, buttons, daguerreotype frames, hooks-and-eyes, cutlery, &c., are treated of. At Waterbury, in the Naugatuck valley, there are, besides other firms, 28 joint-stock companies engaged in these manufactures, whose capitals vary in amount from about 1,200*l*. to 50,000*l*. The principle of limited liability produces most beneficial results, especially in the case of the introduction of a new invention, or a new manufacture; and an Act of Incorporation for a company, whose capital amounted to 120,000*l*., was only 2s. 1d.!!!

"The round-shaped button is formed by two punches, one working inside the other, each being driven by a separate eccentric, and the inside punch having the longer stroke. By this arrangement the disc is forced through the die, and drops into a box, thus saving the labour of picking out, which is necessary where a single punch and solid die are used. The spindle of the polishing lathe, in which the button is fixed whilst being burnished, makes 10,000 revolutions per minute. The lathe in which the oval frames used as settings, for daguerreotypes, are turned, has an oval chuck, and a stationary cutting tool fixed to the slide rest for 'trueing out' the previously punched oval. Two milling tools are used, one for forming the bevilled edge, the other for ornamenting the face of the oval frame. The milling tool, as it revolves, is allowed to swivel so as to accommodate itself to the oval. When the bevilled edge has been formed, the first milling tool is removed, and another substituted while the work revolves. One workman is able to turn, and ornament by milling, two gross of frames per day." In the pin and hook-and-eye manufactory no strangers are allowed, under any circumstances whatever, to see the machines at work; and the company prefer keeping their mode of operation a secret to taking out a patent. The pins are all papered by machinery, and this is the only process permitted to be seen.

The Fourth Chapter treats of locks, porcelain handles, clocks, pistols, and guns; and the places visited were, Pittsburgh, New Haven, Worcester, and Hartford. At New Haven lock-handles are made of coloured clays, so mixed as to present a grained appearance. They are first moulded by hand, then turned in a self-acting lathe with great rapidity, and are afterwards baked in a furnace.

In section 22, 'Clock-making,' it is said "The celebrity attained by New England in the manufacture of clocks gave a peculiar interest to a visit to one of the oldest manufactories of Connecticut; 250 men are employed, and the clocks are made at the rate of 600 a day, and at a price varying from 1 to 10 dollars, the average price being 3 dollars. The frames of the clocks are stamped out of sheet brass, and all the holes are punched simultaneously by a series of punches fixed at the required distances. The wheels also are stamped out of sheet brass, and a round beading is raised by a press round their rims for the purpose of giving them lateral strength. They are cut by a machine having 3 horizontal axes, carrying each a cutter placed about 4 inches apart. The first cutter is simply a saw, and the second rounds off the teeth. In cutting an escapement wheel, the first cutter is made to cut each tooth entirely round, and then either the second or third axis with its cutter is used for finishing. The pullies on the three axes are driven by one driving pulley with three straps working over and in contact with each other. The plates forming the clock faces, and other discs, are cut out by circular shears. The beaded rims intended to go round the clock faces, varying in size from 15 inches downwards, are stamped in concentric rings out of a disc, and then made of the required form by means of dies and a stamping press. The ogee form given to the wooden framing of the common clock is formed by a revolving cutter of the required shape, making 7000 revolutions per minute, over which the piece of wood is passed by hand,—the requisite pressure downwards being given at the same time. A circular cutter fixed on a horizontal axis is also used for roughly planing the back parts of the wooden clock. Its diameter is about 18 inches, and it has 4 lateral projections, carrying 4 cutters, 2 gouges and 2 chisels. These revolve round a fixed circular centre plate, of about a foot in diameter, against which the work is pressed as it is passed along. Each clock passes through about 60 different hands; more than half of the clocks manufactured are exported to England, and of these a large portion are re-exported to other markets. And it is worthy of remark, that the superiority obtained in this particular manufacture is not owing to any local advantages; on the contrary, labour and material are more expensive than in the countries to which the exportations are made; it is to be ascribed solely to the enterprise and energy of the manufacturer,

and his judicious employment of machinery." In a large manufactory of revolving pistols at Hartford, self-acting machinery and revolving cutters are used for making all the separate parts, and the tools are made and repaired in a machine shop which is attached to the works.

The fifth chapter is devoted to wood working, the places visited being Lowell, Buffalo, Philadelphia, Baltimore, Worcester, and New Haven. After referring to the attention which is paid in America to labour-saving machinery for the working of wood, the report proceeds to describe the saw mills at Lowell and Buffalo; at the former trees are dragged up an inclined plane from a dock-basin into the interior of the mill, to the spot where two circular saws are ready to operate on them. "Many works in various towns are occupied exclusively in making doors, window frames, or staircases by means of self-acting machinery, such as planing, tenoning, morticing, and jointing machines. They are able to supply builders with the various parts of the woodwork required in buildings at a much cheaper rate than they can produce them in their own workshops without the aid of such machinery. In one of these manufactories twenty men were making panelled doors at the rate of 100 per day." In planing-mills for flooring boards at Philadelphia, four of Woodworth's machines "were working in one room side by side; they have three cutters on each horizontal axis, having a radius of 6 inches, and making 4,000 revolutions per minute. The cutters are said to be capable of planing from 2,000 to 3,000 feet of work without being sharpened with the oil-stone, and from 20,000 to 30,000 feet without being ground. They plane boards 18 feet long, varying in width from 3 to 9 inches, at the rate of 50 feet per minute. At the same time that the face of the board is planed, it is tongued and grooved by cutters revolving with a radius of about 3 inches, on vertical axes on each side of the board. The chips made by the four planing machines are driven through large pipes, and fall into a trough about 20 inches wide, running across the room immediately under the cutters. In this trough works an endless chain, on which are fixed wooden scrapers that carry along the chips as they fall, to a recess at the side of the room. Here they are carried off by the scrapers of another endless chain running up an inclined plane. The pulleys on which this side chain works are larger in dimensions than those of the transverse chain which works inside. The transverse chain thus deposits its chips in the trough of the inclined plane, and they are carried up to a hole in the ceiling of the fuel room, adjoining the boiler house: through this hole they fall into the fuel room, and fill it up, if necessary, to the top. Where an accurately smooth surface is required, Daniel's planing machine is employed. It consists of an upright frame, in which a vertical shaft revolves, having horizontal arms, at the ends of which are fixed the cutters. The work is carried along on a travelling bed under the cutters, which are driven at a very high speed." The spill or match-making machine makes 900 round spills, 15 inches long, ¼ inch diameter, per minute; and its cost would not exceed 20*l.* A line of 15 tubular cutters, or long, sharp-edged punches, is fixed to a horizontal bar, to which motion is given by a crank, which impels the cutters against the timber. This bar is depressed at each stroke, sufficiently to allow each cutter to cut out its spill, which passes through and falls out behind. In a Last and Boot-tree Manufactory, "a pattern last, and the block of wood from which another last is to be cut, are fixed upon, and revolve round a common axis, being connected with the centres of a headstock fixed on a frame made to oscillate from below. As the pattern revolves it is kept continually pressed against a knob of iron by a spring, and as the block of wood revolves it is shaped by a circular cutter, revolving on a fixed axis, with its cutting edges in a line with the face of the knob. The pattern and the copy revolving simultaneously on a common axis, as the surface of the pattern is pressed against the projecting knob, the oscillating frame is made to move, so that the revolving cutters shape from the block a surface exactly corresponding to the surface of the pattern, and the copy occupies relatively to the cutters the same position which the pattern does relatively to the knob of iron. About 18 men are employed, who make 100 pair of lasts per day, exclusive of boot trees." For furniture making, labour saving machines of all kinds are very advantageously employed. An apparatus of a very simple character is used for shaping the arms and legs of chairs. "In a plough manufactory at Baltimore eight machines are employed on the various parts of the woodwork, by which seven men are able to make the wooden parts of 30 ploughs per day." The prices of these ploughs vary from 2½ to 7 dols. A mowing machine drawn by 2 horses, mowed on an average 6 acres of grass per day. "The machine is similar in its construction to the common reaping machine, but it has only one wheel, furnished with projections to prevent it from slipping. This wheel gives motion to the cutters, and supports one side, the other rests on a runner like that of a sledge." "The churns (made at a manufactory at Worcester) consist of a double case, the inner one being of zinc, which receives the milk or cream, and in which the arms revolve, the outer one being of wood. It is found by experience that butter is formed most rapidly when the milk or cream is churned at a certain temperature, and in order to obtain this temperature, which is indicated by a thermometer inserted in the churn, warm or cold water is introduced between the inner zinc and outer wooden casing, as may be required."

The sixth chapter treats of stone-planing works—brick making from dry clay, the places visited being Staten Island, New York, and Washington. Considerable difficulties have hitherto attended the employment of machinery for planing stone such as granite, but these have been successfully surmounted. At Washington, "the planing machine consists of an upright frame, in which revolves a vertical shaft, carrying 3 horizontal arms. At the extremities of these arms, are fixed circular cutters inclined outwards about 45° from the perpendicular, or about the angle at which the workman would hold his chisel. They are about 10 inches in diameter, and ⅜ inch thick, made of steel, and bevilled on both sides, leaving a sharp edge. They are fitted upon axes, and are at liberty to revolve loosely in their bearings as their edges strike the stone. The cutters are carried round by the shaft at the rate of about 80 revolutions per minute when planing freestone, and 60 when planing granite. The stone is moved forward on a bed to which it is keyed: the cutters strike its surface obliquely as they are carried round on the revolving arms turning at the same time on their own axes, and chipping and breaking off the projecting portions of the stone at every cut. The machine planed the face of a stone slab, 4 feet long and 2 feet wide, in seven minutes. Another modification of this machine, which is not so economical, is employed when it is necessary that the face of the stone be left in lines as it came from the tool." In the Stone Polishing Machine, "The stone is polished by a flat circular disc of soft iron, which is made to revolve horizontally." In Brick Making with Dry Clay, the clay is collected in dry weather "by slicing it from the surface with a kind of shovel having a sharp edge, which is drawn by two horses, and will hold about two barrowsful. In wet weather the surface of the clay is harrowed to the depth of 2 or 3 inches by a triangular wooden frame carrying 9 teeth, a process which in the powerful rays of an American sun soon causes the moisture to evaporate. It is then taken off by the scoop or shovel before described." After being screened, the clay is raised, by elevators, to the height of about 12 feet, and is then conveyed to rollers, where it is ground, and is afterwards shovelled into hoppers which feed the moulds, placed six in a row. The bricks are powerfully compressed by presses, or rams, raised by a cam, and are then burnt. The best burnt bricks equal in quality to the best English stocks, were selling at 12 dollars per 1000.

In the seventh chapter, India rubber manufactory,

fishing-net making machine, flour mills, and elevators, are treated of, and it is stated that, by a new process of hardening India rubber that substance becomes of the consistency of horn, and is then manufactured into combs, walking sticks, and other articles. In the manufacture of India rubber overshoes, "the India rubber in its rough state is first cut up by shears into small pieces. It is then put through a machine similar to that used for tearing and cleaning rags intended to be made into paper. The water used in the operation is drawn off from time to time through a wire grating." It is then ground, kneaded, and worked with the necessary composition, and is passed through rollers in the form of an endless web. "The India rubber cloth is cut out from the sheet by workmen, in the shape required to form shoes. The parts so shaped are put together by women, who form them on lasts, closing the joints by cohesion after touching them with camphine. Each woman finishes an entire shoe, and about 1400 pairs are made daily. The shoes are then covered with a coat of varnish, and taken to the stove drying room, where they are subjected to a heat of from 250 to 280 degrees, and allowed to remain a night." The fishing net machines at Baltimore combine the general features of the power loom and the lace machine, and one machine can net from a $\frac{3}{4}$-inch mesh to $1\frac{3}{4}$ inch to $2\frac{1}{4}$ inches mesh. The meshes are made rectangular, in the direction of the length of the net, and not diagonally, as in the hand-made nets. One woman can do the work of upwards of 100 hand netters. The cost of the machine is about 160*l*." The manufacture of sailcloth is carried on in the mill where these machines are at work. The throstles for spinning yarn for the sailcloth spin six hanks to the pound. The carding engine sliver is carried by the railroad system along a trough to the drawing frame. The main cylinder of the carding engine is 36 inches in diameter, and the doffing cylinder 13 inches, the former making 135 revolutions and the latter seven revolutions per minute. In the fly-frame the front roller makes 200 revolutions per minute, and the flyer from 1,900 to 2,000. By some shipowners sailcloth made of cotton is preferred to that made from hemp. Fishing nets made by hand are here also manufactured of cotton." The corn and flour mills at Pittsburgh produce 500 barrels of flour per day, each containing 196lbs. The grain is lifted into the mill by means of an elevator. It is next allowed to descend into a large hopper, where its weight is registered. It is then allowed to descend to a lower story, from whence it is raised to the highest story of the mill, where it is cleaned by passing through three different machines. It is then conducted to the stock-hoppers, which feed eight pairs of grinding-stones, and when ground, the meal "is conveyed by means of a spiral conveyor to the cooling chamber, where a rake, revolving horizontally, is substituted for the old 'hopper boys.' The meal is raked from the circumference to the centre, where it falls through a hole and is taken to the bolting machine; it is there sifted, and separated into different qualities of flour. It is then conveyed to hoppers, from which it descends by spouts into the barrels in which it is packed."

In the eighth chapter the manufacturing companies, civil engineering, cotton mills, carpet manufactory, woollen and felt cloth making, sewing machinery, and cotton gin are considered, the places visited being Lowell, Lawrence, Holyoke, New Haven, and Waterbury. At Lowell there are twelve large manufacturing establishments, eight of cotton goods, two of woollen goods, carpets, rugs and broadcloths, one is a bleaching concern, and one is a machine shop, their total capital amounting to 2,800,000*l*. Water power acting through powerful turbine wheels is used for driving the machinery in all the mills, the gearing being exceedingly well constructed. At Lawrence there are seven large incorporated cotton mills; and a new cotton mill, for the purpose of manufacturing mousselines de laines, barèges, and other light fabrics, has lately been erected." The whole waste from the (woollen cloth) mills is worked up in the manufacture of felted cloth. The felt-making machines occupy but a small space. A sliver of wool is taken from the carding engine and passed between two endless cloths; these carry it over a narrow steam box, where it is steamed, and it is then passed under a vibrating pressing-plate, which operations cause the fibres to curl and interlace with each other, and so form a cloth." At Holyoke there are two cotton mills, a machine shop, and a paper mill, all of which have been established since 1847. "In some mills, gearing is employed for driving the heavy shafting, but generally belts are much preferred." A large establishment at Waterbury is occupied exclusively in the manufacture of under-vests and drawers. The cloth waistbands of the latter are stiched by sewing machines, working at the rate of 430 stiches per minute. These machines have been worked with entire success for the last eighteen months. The manufactured goods and the sewing machines are all that are shown to visitors. No stranger is ever permitted to see the hosiery looms; workmen, directors, and president all enter into a bond not to disclose anything connected with the machinery of the company." In a shirt manufactory at New Haven, entire shirts, excepting only the gussets, are sewn by sewing machines, and by their aid one woman can do as much work as from twelve to twenty hand sewers. A new cotton gin is thus described:—"This gin has, instead of saws, a card cylinder 8 or 9 inches in diameter, covered with coarse wire teeth, with considerably more bend or hook than the ordinary card tooth. The cylinder revolves against a spirally fluted cast-iron roller, the tooth being about one-tenth inch, and the space between the teeth three-tenth inch broad. To save the expense of turning and fluting the roller, it is cast in lengths of about six inches, which are bored and turned at the ends, and then put together, the tooth and space being left as they are cast. In contact with the card cylinder, a cylindrical brush, 28 inches diameter, is made to revolve. The card cylinder makes 200 revolutions, the fluted stripper 400 in a contrary direction, and the cylindrical brush 800 revolutions per minute. When the raw cotton is introduced with its seeds between the card cylinder and the stripper (which are placed so far apart as to stop the seeds from passing), the hooked teeth of the card take hold of the fibres and pull them from the seed, which is held up against the roller as long as any fibres cling to it for the card teeth to hold by: the seeds are then released, and fall to the ground. The spirally fluted roller causes the position of the seed and cotton to be continually changing. The cotton fibres, as they are taken round by the teeth of the card cylinder, are brushed off by the rapid revolution of the cylindrical brush, and carried to the bin. The machine is about 60 inches wide, and can gin 1,500 lbs. of cotton per day. Its cost is 70*l*."

The next chapter treats of railways—railway carriages—large four-masted ship--fire companies—and fire engines. The first of these subjects has been frequently described, but a "contrivance has been lately tried for excluding the dust (from railroad carriages) by connecting the different carriages together by india-rubber curtains at the ends, the air being admitted through the roof of the first carriage. The object sought to be obtained is, a current of air running through the entire train, and always setting outwards from the interior of the carriages. The results did not appear to answer fully the expectation which had been formed." "A four-masted clipper ship, of 4,000 tons, was being built at Boston; the length of keel was 287 feet, length on deck 320 feet, extreme breadth of beam 52 feet, and depth of hold 30 feet. Her keel is of rock maple in two thicknesses; the frame is of seasoned white oak, dowelled, and bolted together through the dowelling with $1\frac{1}{4}$ inch iron. The frame inside is diagonally cross-braced with iron, the braces being 4 inches wide and $\frac{3}{4}$ inch thick, bolted through every timber: these braces extend from the floor-heads to the top timbers, and form a perfect network of iron over all her frames fore and aft." She has five depths of mid-ship keelsons, three full decks, and a hurricane-deck over all, merely for

working the ship. When loaded ready for sea her draught of water will not exceed 23 feet, a common draught for ships half her size. "The fire companies are formed in many towns of volunteers, who do not receive pay, but enjoy certain immunities from taxes and militia service." On a parade day an engine with a 10-inch cylinder threw a stream of water over a pole 150 feet high.

The Government works at New York, Boston, Washington, and Springfield, are described in the tenth chapter. At the Navy Yard, at the former place, a vessel may be docked in a capacious dry-dock in four hours, though the quantity of water to be removed is about 610,000 cubic feet. At the Boston Navy Yard "a set of machinery is used for making sheaves for ship blocks. An ingenious machine was employed for boring the sheaf, and recessing it on both sides for receiving the bush. Two lathe headstocks are mounted on a frame, and carry the small revolving cutters for making the recesses. An universal concentric chuck with three 'jaws,' having a large hole in its centre, is mounted between the headstocks. This carries the work, and has a vertical adjustment." At the Springfield armoury machines are employed in the manufacture of musket-stocks, involving 16 distinct machine operations, occupying together 28 minutes 45¼ seconds. Two hand operations are required, occupying 2 minutes 17 seconds, making a total of 31 minutes 2¼ seconds; but an allowance of 8 minutes 58 seconds has to be made for double simultaneous operations during turning, leaving 22 minutes 4¼ seconds as the man's time given to the whole operations of making a complete musket-stock. "The general principle adopted in the construction of these machines is that of guiding the cutter in its course, by a shaper or 'former,' that is, a pattern made exactly of the form in which it is required that the work should be shaped." The stocks are purchased rough from the saw for 1s. 2d. each. The barrels are made in mills. The complete musket is made (by putting together the separate parts) in 3 minutes.

The Coast Survey Office, at Washington, supplies the capital of every State in the Union with a full set of standard weights and measures, consisting of "1. A set of standard weights from 1lb. to 50lbs. avordupois, and 1lb. troy; 2. From 1oz. down to 1-10,000th oz. troy; 3. A yard measure; 4. Liquid measures—the gallon and its parts down to half-pint inclusive; 5. A half-bushel measure." And, in addition, with three very accurate balances, constructed to weigh from 50lbs. down to 10lbs.,—from 10lbs. to 1lb.,—and from 1lb. to 1-10,000th oz. The estimated cost of the three latter is about £900.

"The United States standard yard has been obtained from a seven feet standard procured from England. It is made of gun-metal, about 2 inches broad and three-eighths of an inch thick, and has a thin strip of silver, one-fifth of an inch broad, let into it through its entire length. It is divided into small divisions, each being an aliquot part of an inch." "Monetary accounts are kept, and calculations are made with the greatest facility in dollars and cents, the dollar (4s. 2d.) being divided into 100 cents (a cent ½d.). Convenient coins called "dimes" are in circulation, 10 cents being equal to one dime, and 10 dimes making a dollar." "It is a matter of surprise that while the people of the United States have long felt and appreciated the benefits of their decimal monetary system, the old English system of weights and measures has not yet been abolished by the Legislature."

The eleventh chapter is devoted to the Electric Telegraph, which was so promptly appreciated by the United States, and by which distances are to be measured by intervals, not of space, but of time. In 1844, Congress made a liberal grant in order to put in operation the first telegraph line that was erected in the States—that between Washington and Baltimore—and in 1852, there were upwards of 15,000 miles in operation, belonging to from 20 to 30 different joint-stock companies. The systems generally in use are those of Morse (12,124 miles), Bain (1,199 miles), and House (1,358 miles).

"Professor Morse employs receiving magnets which close local circuits attached to each telegraph office, and so charge another magnet called the register magnet; this acts upon an armature attached to a lever which presses down a metallic point upon a cylindrical roller, a strip of paper is passed at an uniform rate between the metal point and the roller, and by the indentation of lines and dots, representing letters of the alphabet, the message transmitted is registered at the rate of about 20 words per minute." "The cost of a Morse Register is about 8*l*. The system patented by Mr. Bain is called the Electro-chemical Telegraph. He employs a metal disc, carrying a prepared sheet of paper, on which lines and dots are marked by the decomposition of a metallic point, acted upon by an electric current. The metal disc revolves at an uniform rate by the agency of clock-work, and the point or pen is made to move over the paper laid on the disc in the direction of a spiral. No receiving magnet is necessary, and a comparatively weak current of electricity, traversing long wires, leaves instantaneously a mark upon the prepared paper." * * * "In Mr. House's system the message is printed by the telegraph instrument itself. The electric current is made to act by rapid pulsations on an 'axial magnet' that opens and closes a valve connected with a pneumatic printing-machine. The machine, which is ably contrived, is worked by manual power, and prints messages at the rate of about 20 words per minute; its cost is about 50*l*. Grove's batteries are generally used in all the systems." "Messages are charged at the rate of 50 cents (2*s*. 1*d*.) for 10 words, and 5 cents (2½*d*.) for every additional word, for transmission from New York to Washington, a distance of 270 miles." * * * "The cost of erecting telegraph lines varies according to localities, but the expenses upon the whole are estimated to average about 35*l*. per mile throughout the States; the moderate amount of this estimate is, in a great measure, to be attributed to the facilities afforded by the general telegraph laws for the formation of companies and the construction of lines." * * * "The application of the electric telegraph is not confined to the transmission of messages from one part of the States to another: in the form of a local or municipal telegraph, it is employed as an important instrument of regulation and intelligence in the internal administration of towns. No adaptation of the system can be more interesting and useful than that which is made for the purpose of conveying signals of alarm and intelligence in the case of fire. This system has been very completely developed in Boston." The city is divided into seven districts, comprising 42 stations, all of which are connected with a central office, to which intelligence of fire is conveyed, and from which the alarm is given. At each of these stations there is a cast-iron box, kept locked, containing a handle which "turns a wheel that carries a certain number of teeth, arranged in two groups, the number of teeth in one representing the district, in the other, the station; these teeth act upon a signal key, closing and breaking the circuit connected with the central office as many times as there are teeth in the wheel. Signals are thus conveyed to the central office, and, by striking the signal bell a certain number of times, the district and station from which the signal is made is indicated." An attendant at the central office "immediately sets in motion his alarm apparatus, and by depressing his telegraph-key, causes all the alarm bells of the seven districts to toll as many times in quick succession as will indicate the district where the fire has occurred, the alarm being repeated at short intervals for as long a time as may be necessary."

The Patent System of the United States forms the concluding chapter. The office is at Washington, where there are model-rooms which "contain upwards of 23,000 models, arranged in large glass cases; but there is no cata-

logue to assist or guide those who search for any particular model that may be required for inspection." The official staff comprises a commissioner, a chief clerk, six examiners, twenty assistants, a librarian, a machinist, an agricultural clerk, and twenty temporary clerks; whose salaries amount to about 11,200*l*. "The amount of business transacted in the office in 1852 will appear from the following statement:—Applications for patents pending January, 1852, 155; Applications received during 1852, 2,639; Patents issued, 1,020; Rejections and suspensions, 1,293; Applications undecided, 481." "An original inventor only is entitled to apply for a patent; the mere introducer of an invention has no claim whatever." "In other respects there is not much difference between the law of England and that of the United States." "With regard to prior use, an inventor has very extensive privileges in the United States. He may, during the period of two years, publicly use, and even sell his invention, without invalidating a patent obtained at the end of that time; but a public use for a longer time is considered as an abandonment of his discovery to the public. A prior discovery will not invalidate a subsequent patent if it can be shown that it was laid aside without being perfected or reduced to practice." "The specification differs but little in its character from an English specification. It is not, however, construed with the same rigid severity." "Drawings, models, and specimens are always absolutely requisite whenever the case admits of their being supplied." The examination of the documents furnished to the Patent Office with the application is very strict, and the claims in respect of novelty undergo long consideration; all claims savouring of a 'double use' being rejected." If, the applicant is dissatisfied with the decision of the Commissioners of Patents, he may appeal to the District Judge of Columbia, on paying 5*l*., and a still further appeal may made by a bill to a court of equity. "When an application for a patent is refused or withdrawn, two-thirds of the fees paid are returned, unless a caveat fee had been reckoned in the amount."

"The following is the scale of fees payable in connection with the grant of letters patent in the United States:—

	Dolls.	£
On application for a design	15	(about 3)
" a caveat	20	(" 4)
" a patent in the case of a citizen or resident foreigner intending to become naturalised	30	(" 6)
" in the case of a British subject	500	(" 105)
" in the case of any other foreigner	300	(" 63)
" Disclaimer	10	(" 2)
Addition of improvements	15	(" 3)
Re-issue	15	(" 3)
Extension of term	40	(" 8)
Appeal	25	(" 5)

LIVERPOOL CHAMBER OF COMMERCE.—At a special meeting of the Commerce, at Liverpool, on Monday, called for the purpose of considering the expediency of modifying the present state of the law in respect of the unlimited liability of partners, the following motion was agreed upon by a majority of 11 to 8:—"That this Council, having given full consideration to the report of the sub-committee on this subject, hereby affirm the principle set forth, viz.—That the present law, in so far as it prohibits the formation of partnerships with limited liability is unsound, and an alteration in this and other respects is urgently required." Before the close it was agreed to have another special meeting, to adopt any practical measures in regard to it that may be desirable.

THE ORGANIZATION OF THE CIVIL SERVICE.

A report has just been presented to Parliament by Sir Stafford Northcote and Sir C. E. Trevelyan.

The report commences by calling attention to the importance of the permanent Civil Service, and its generally acknowledged merits, admitting its defects, and that it offers little attraction to the ambitious.

The comparative lightness of the work, and the certainty of provision in case of retirement owing to bodily incapacity, furnish strong inducements to the parents and friends of sickly youths to endeavour to obtain for them employment in the service of the Government; and the extent to which the public are consequently burdened, first with the salaries of officers who are obliged to absent themselves from their duties on account of ill health, and afterwards with their pensions when they retire on the same plea, would hardly be credited by those who have not had opportunities of observing the operation of the system. The result naturally is, that the public service suffers both in internal efficiency and in public estimation.

There are, however, numerous honourable exceptions to those observations, and the trustworthiness of the entire body is unimpeached.

The difficulties of the Civil Service in obtaining a good supply of men, as compared with other professions, are partly natural and partly artificial.

Those who enter it generally do so at an early age, when there has been no opportunity of trying their fitness for business, or forming a trustworthy estimate of their characters and abilities. In other professions there is a corrective, wanting in the Civil Service, viz., a sharp competition on the part of one's contemporaries; the able and energetic rise to the top; the dull and inefficient remain at the bottom. In the public establishments, on the contrary, the general rule is that all rise together. After a young man has been once appointed, the public have him for life, unless he is idle or inefficient, or grossly misconducts himself. The feeling of security which this state of things necessarily engenders tends to encourage indolence, and thereby to depress the character of the Service.

The character of the young men admitted to the public service depends entirely upon the discretion of the heads of departments and others entrusted with the patronage. Where the patronage belongs to the chief for the time being, the appointments are either those of junior clerks, with unimportant duties in the first instance, or of persons for responsible and highly paid situations above the rank of the ordinary clerkships. In the first case, the o ice is bestowed upon some one having personal or political claims, without any very minute inquiry. The young man thus admitted is commonly employed upon duties of the merest routine. His official life can only exercise a depressing influence on him, and renders the work of the office distasteful to him; he not only begins with mechanical labour as an introduction, but often ends with it. In the mean time his salary is gradually advancing till he reaches, by seniority, the top of his class, and on the occurrence of a vacancy in the class above him he is promoted to fill it, as a matter of course. Thus while no pains have been taken in the first instance to secure a good man for the office, nothing has been done after the clerk's appointment to turn his abilities, whatever they may be, to the best account. The result naturally is, that when the chief of the office has to make an appointment of visible and immediate importance to the efficiency of his department, he sometimes has a difficulty in finding a clerk capable of filling it, and he is not unfrequently obliged to go out of the office, and to appoint some one of high standing in an open profession, or some one distinguished in other walks of life, over the heads of men who have been for many years in the public service. This is necessarily discouraging to the Civil Servants, and

tends to strengthen in them the injurious conviction that their success does not depend upon their own exertions, and that if they work hard, it will not advance them,—if they waste their time in idleness, it will not keep them back.

It is of course essential to the public service that men of the highest abilities should be selected for the highest posts; and it is probable that under any circumstances it will occasionally be found necessary to fill them with persons who have distinguished themselves elsewhere than in the Civil Service. But the system of appointing strangers to the higher offices has been carried far beyond this. In several departments the clerks are regarded as having no claim whatever to what are called the staff appointments; personal or political considerations have frequently led to the appointment of men of very slender ability, and perhaps of questionable character, to situations of considerable emolument, over the heads of public servants of long standing and undoubted merit. Few public servants would feel the appointment of a barrister of known eminence and ability to some important position, like that of Under Secretary of State, as a slight; but the case is otherwise when some one who has failed in other professions, and who has no recommendation but that of family or political interest, is appointed to a Librarianship, or some other such office, the duties of which would have been far better discharged by one who had been long in the department, and to whom the increased salary attached to the appointment would have been a fair reward for years of faithful service.

The fragmentary character of the service remains to be noticed.

Each man's experience, interests, hopes, and fears, are limited to the special branch of service in which he is himself engaged. This naturally cramps the energies of the whole body, encourages the growth of narrow views, limits the experience, and represses the spirit of emulation and competition. Such are some of the difficulties with which the public service is beset.

The report advocates the training of young men rather than taking them from other professions. A young man who has not made trial of any other profession will be induced to enter that of the Civil Service by a much more moderate remuneration than would suffice to attract him a few years later from the pursuit of one in which he had overcome the first difficulties and begun to achieve success; while to attempt to fill the ranks of the Civil Service with those who had failed elsewhere, and were on that account willing to accept a moderate salary, would be simply to bring it into discredit. The temptation to jobbing, and the danger of decidedly improper appointments being made, is also considerably less in the case of the selection of young men, than in that of persons more advanced in life.

The general principle is, that the public service should be carried on by the admission into its lower ranks of a carefully selected body of young men, employed from the first upon work suited to their capacities and their education, and made constantly to feel that their promotion and future prospects depend on the ability with which they discharge their duties; that with average abilities and reasonable application they may look forward confidently to a certain provision for their lives, that with superior powers they may rationally hope to attain to the highest prizes in the Service, while if they prove decidedly incompetent, or incurably indolent, they must expect to be removed from it.

The first step towards carrying this principle into effect should be, the establishment of a proper system of examination before appointment, which should be followed, as at present, by a short period of probation. The necessity of this has been so far admitted that some kind of examition does now take place before clerks are admitted into certain offices. These examinations vary in their character; in some offices more is required than in others, and in some cases what is required will be more rigidly enforced by one set of examiners than by another.

The preliminary examination of candidates for civil employment, however, cannot be conducted in an effective and consistent manner throughout the Service, while it is left to each department to determine the nature of the examination and to examine the candidates. The time and attention of the superior officers are fully occupied in disposing of the current business of their respective departments. In a large department want of time will prevent the superior officers from giving the subject the attention it deserves. Moreover, a large proportion of the persons appointed to a public department usually consists of young men in whose success the heads of the office or the principal clerks take a lively personal interest, from relationship or some other motive; and an independent opinion is hardly to be expected. Even supposing every other circumstance to be favourable, it is impossible that each department, acting for itself, can come to such just conclusions in regard to the nature of the preliminary examination, or can conduct it in such a fair, effective, and consistent manner, as would persons having the advantage of a general view of the subject as it affects every public department, and selected for the duty on account of their experience.

The report recommends that a central Board should be constituted for conducting the examination of all candidates for the public service whom it may be thought right to subject to such a test. Such board should be composed of men holding an independent position, and capable of commanding general confidence; it should have at its head an officer of the rank of Privy Councillor; and should either include, or have the means of obtaining the assistance of persons experienced in the education of the youth of the upper and middle classes, and persons who are familiar with the conduct of official business. It should be made imperative upon candidates for admission to any appointment, (except in certain special cases which will presently be noticed,) to pass a proper examination before this Board, and obtain from them a certificate of having done so.

It is considered that this examination should be in all cases a competing literary examination. This ought not to exclude careful previous inquiry into the age, health, and moral fitness of the candidates. Where character and bodily activity are chiefly required, more, comparatively, will depend upon the testimony of those to whom the candidates are well known; but the selection from among the candidates who have satisfied these preliminary inquiries should still be made by a competing examination. This may be so conducted as to test the intelligence, as well as the mere attainments of the candidates.

For the superior situations endeavours should be made to secure the services of the most promising young men of the day, by a competing examination on a level with the highest description of education in this country. In this class of situations there is no limit to the demands which may ultimately be made upon the abilities of those who, entering them simply as junior clerks, gradually rise to the highest posts in them. To obtain first-rate men, it is obvious that recourse should be had to competition. The positive test of passing an examination equal to that of first-class men at the universities is impossible; but if a number of candidates present themselves, some of whom are capable of passing such an examination, there can be no reason why the public should not have the benefit of such men's services, in preference to those of persons of inferior merit.

The proposal is not inconsistent with the appropriation of special talents or attainments to special departments of the public service. In the case, for example, of the subordinate grades from which collectors, surveyors, secretaries, junior commissioners, and other superior officers of the Revenue departments are usually selected, the nature of the examination should be adapted to the object of securing the scientific and other attainments

which are so important to the efficiency of these great national establishments. In the same way provision might be made for securing the peculiar attainments to be required of persons to be employed in the Foreign Office, and in the diplomatic and consular services; and in respect to offices of account, arithmetic and book-keeping will be principally insisted on.

It next becomes a question, whether the competition proposed should take place on each vacancy, or whether there should be periodical examinations. The report adopts the latter alternative. It economises the number, and also the time of the examiners, by regularly distributing their employment. It is also more convenient to the candidates themselves. Examinations should be held at stated times; and an average having been taken of the number of situations of the class contended for, which periodically fall vacant, it should be announced, before the commencement of each trial, how many gentlemen were to be elected for admission into the public service on that occasion. The election having taken place, those who have succeeded should be distributed among the offices to which appointments are to be made, on the footing of probationers. The precise mode in which the successful candidates should be allotted to the several departments will require some consideration; but there will be no difficulty in it which may not easily be overcome. One obvious course of proceeding would be to send to each department a list of those who are selected for appointments, leaving to the head of each office to choose from among them as vacancies occur. Or it might be thought desirable that the Board of Examiners should recommend particular men to particular departments, according to their capacities, the head of the department in each case exercising his discretion in accepting them or not; or the choice might be given to the candidates themselves, some restriction being imposed to prevent any from choosing offices for which their peculiar education had not fitted them. If more have been elected (in order to maintain the average) than there is immediate demand for, they should be sent as supernumerary clerks to the offices in which the work happens to be the heaviest, unless there is any special service upon which they can with advantage be temporarily employed; or they might wait to take their turn. As vacancies occur from time to time before the next general examination, the supernumeraries should be appointed to them, and, if the whole have not been placed before that time, it will only be necessary to make the next batch smaller. It would be desirable to retain the probation as at present, rendering it more efficient by precise reports of the conduct of the probationers.

In these examinations the right of competing should be open to all persons, of a given age, subject only to the necessity of their giving satisfactory references as to their moral conduct and character, and of producing medical certificates that they have no bodily infirmity incapacitating them for the public service.

The choice of the subjects for examination, and the mode of conducting it should be left to the Board of Examiners. The subjects should be as numerous as practicable, so as to secure the greatest and most varied amount of talent for the public service. Men whose services would be highly valuable to the country might easily be beaten by some who were their inferiors, if the examination were confined to a few subjects to which the latter had devoted their exclusive attention; but if an extensive range were given, the superiority of the best would become evident. Opportunity would thus be afforded for judging in what kind of situation each is likely to be most useful; and it could not fail to produce an important effect upon the general education of the country, if proficiency in history, jurisprudence, political economy, modern languages, political and physical geography, and other matters, besides the staple of classics and mathematics, were made directly conducive to the success of young men desirous of entering into the public service. Such an inducement would probably do more to quicken the progress of our universities than any legislative measures that could be adopted.

The examination should include some exercises directly bearing upon official business: to require a preçis to be made of a set of papers, or a letter to be written under given circumstances; but the great advantage to be expected from the examinations would be, that they would elicit young men of general ability.

There will be some cases in which examination will not be applicable. This test cannot be imposed upon persons for staff appointments, on account of their acknowledged eminence in one of the liberal professions, or in some other walk of life.

The examination for the lower class of appointments should be local, otherwise candidates might be deterred by expenses of travelling. Arrangements should be made for holding examinations in various parts of the United Kingdom. A staff of assistant examiners might be formed, or the services of competent men might be engaged from time to time, or recourse might be had to the machinery of the Education Department of the Privy Council, for the purpose of holding district examinations at stated periods. Due notice should be given of the times and places at which such examinations are to be held, and all persons intending to compete should be required to send in their names by a certain day. The examinations should all take place on the same day, the examination papers being sent to each locality by the same post, as is done in the examinations conducted by the Education Department; and the papers, with the work of the candidates, being returned to the Central Board, which would cause them to be examined in the manner adopted at the Privy Council Office.* The required number should then be selected as probationers for the various appointments to be filled. No formidable difficulty is apprehended in making the necessary arrangements to meet the vast majority of cases. Mr. John Wood, the Chairman of the Board of Inland Revenue, has, as far as he was able, acted on these principles in the selection of Excisemen; and the experiment has succeeded in a manner which is highly encouraging to further attempts in the same direction. The first proposal to subject public appointments to competition was made by the Government of Lord John Russell, in 1846.

The age of admission for superior situations should, as a general rule, be from 19 to 25; in the case of inferior officers, from 17 to 21.

In order to maintain the efficiency of the office at the highest point, it is recommended that a proper distinction between intellectual and mechanical labour should be established. This, however, depends more upon the chiefs of offices and those immediately below them, than upon any regulations of a central authority. The appointment in several offices of a class of supplementary clerks, receiving uniform salaries in each department, and capable therefore of being transferred, without inconvenience, from one to another, is a very imprudent step; and the moveable character of this class of officers, and the superior standard of examination proposed for the higher class, will mark the distinction between them in a proper manner.

The creation of a general copying office is not recommended, for various reasons set forth in the Report.

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* As the process adopted by the Education Department of the Privy Council may not be generally known, it is well to state, that the papers of the candidates in all parts of the country are sent to the Central Office, where they are sorted according to subjects, and sent to different Inspectors, e.g., all the papers in Arithmetic to one, all in History to another, and so forth. Each Inspector assigns a number of marks to each paper, according to its merit. The papers are then returned; those of each candidate are put together again; the total number of marks which he has obtained is ascertained; and the candidates are finally arranged according to the result of the comparison.

The importance of transferring the clerks from one department of the office to another, so that each may have an opportunity of making himself master of the whole of the business before he is called upon, in due course of time, to take a leading position, is strongly advocated.

The advance of salaries in the public service is regulated upon a twofold principle. Each man, on being appointed to a clerkship in a particular class, receives for the first year, and in some cases for the first two or three years, what is called the minimum salary of that class, after which his salary increases, by a certain annual increment, to what is called the maximum salary; that is to say, if the minimum be 100*l.* a year, the maximum 300*l.*, and the annual increment 15*l.*, the clerk receives 100*l.* in the first year, 115*l.* in the second, 130*l.* in the third, and so on till his salary reaches 300*l.*, at which point it must remain stationary unless he is promoted to a higher class. He may, however, at any time, whether before or after attaining the maximum salary of one class, be promoted to a higher on the occurrence of a vacancy, if he is considered deserving of such promotion, and he will immediately thereupon begin to receive the minimum salary of the higher class, and to advance therefrom by annual increments, without reference to the amount he was previously receiving. The theory of the public service is, that the annual increase of salary from the minimum to the maximum of the class, is given as a matter of course as the reward of service, and with no reference to the comparative merits of the individuals; but that promotion from class to class is the reward of merit, or rather that it is regulated by a consideration of the public interests, and that those only are to be transferred from one class to a higher who have shown themselves capable of rendering valuable services in it. This salutary principle is, however, in practice often overlooked, and promotion from class to class, as well as the annual rise within the class, is more commonly regulated by seniority than by merit.

Doubtless strong objections are entertained against promotion by merit, on the ground that promotion by (so-called) merit would usually become promotion by favouritism. Departmental patronage inspires the clerks with a feeling of jealousy towards any one supposed to enjoy the especial favour of the chief of the department, or of the principal permanent officer in it. The recognition of their merits even within their own departments, is extremely uncertain, and there is no appeal to any public tribunal if injustice is done them there. In an office, if a clerk fails to please his immediate superior, he is probably condemned to obscurity for his whole life. The Parliamentary chief of the department, overwhelmed with business, as a general rule, knows nothing of the merits of individual clerks in the lower ranks of the office, except through the permanent officers. Setting aside actual favouritism, there must be many instances in which the chief permanent officers fail to perceive, and properly to bring into notice, the valuable qualities of those beneath them.

The leading object of Government should be so to regulate promotion by merit as to provide every possible security against its abuse; and for this purpose the following system is recommended: On the occurrence of a vacancy in any class, the Chief Clerk, or other immediately superior officer, should furnish the Secretary of the department with a return of the names of a certain number (in no case less than three) of the Clerks at the head of the class below, accompanied by a special report upon the services and qualifications of each. In case there should be in the lower ranks of the class any man of merit decidedly superior to those above him, his name, with a note of his qualifications, should be added. The Secretary should make what remarks he thinks proper upon the list, and should then submit it to the Head of the Office, who should select the person to be promoted, and should make out and sign a warrant for his promotion, setting forth the grounds upon which it is made. A book should be kept in every office, in which should be entered the name and age of each clerk, or other officer, at the time of his appointment, the dates of his examination, first appointment, and subsequent promotions, together with notes of all the reports made upon him from time to time, either on the occasions afforded by the occurrence of vacancies, or at other times, in consequence of some special instance either of good or ill behaviour. A reference to this book on the occasion of promotion to vacancies would enable the head of the department to form a tolerably correct estimate of the merits of each individual. Such a book is kept, with very good results, in the Commissariat Department.

With regard to the annual increase of salary, it is recommended that each clerk, before becoming entitled to receive the addition, should be required to produce a certificate from his immediate superior, that he has been punctual in his attendance, and has given satisfaction in the discharge of his duties, during the preceding year. Such certificates are required from the heads of rooms in the Ordnance Department, and from each Inspector in the Audit Office.

Attention is called to the importance of establishing an uniform and consistent system of regulating the amounts to be granted to superannuated public servants, with reference to the character of their service. The subject is now under the separate consideration of the government, but it is presumed, that under any circumstances the course now followed in the Treasury, of apportioning the pension of each individual with some reference to the character he has borne and the abilities he has displayed, will still be pursued.

The want of encouragement in the form of good service pensions and honorary distinctions, is also severely felt in the ordinary Civil branch of the public service, which is the only one in which these classes of reward are not dispensed.

It is obvious that the proposed Board of Examiners might be turned to good account in supplying these defects. Duplicates of the books which have been recommended to be kept in the separate offices should be transmitted to the Department of Examination, which should be furnished with all information relating to promotion and other matters bearing on the services of the officers in each department. No grant of superannuation allowance or good service pension should be made by the Treasury without a previous report from the Board of Examiners embodying this information.

By this system, not only would greater certainty be introduced into the superannuation business, but a degree of consistency would be given to the whole scheme of promotion by merit, which would, it is considered, ensure its success. It would have the further advantage of directing the attention of the Government to the merits of individual clerks, and would enable it to select deserving persons from the ranks of the public service to fill important situations. It is to be hoped that in future, if any staff appointment falls vacant in an office in which there is a deserving clerk well qualified to fill it, his claims will not be passed over in favour of a stranger. This principle might advantageously be carried further, by filling the appointment with a person from another office, if there is no one in the department itself qualified to take it; and there might often be occasions in which the advantages of encouraging public servants, and at the same time introducing fresh blood into an office, might be combined; as, for instance, by filling a staff appointment in office A by the transfer to it of a meritorious staff officer from office B, and then supplying the vacancy caused in office B by the appointment to it of one of the most deserving clerks in office A.

The recommendations are thus summed up:—

1. To provide, by a proper system of examination, for the supply of the public service with a thoroughly efficient class of men.

2. To encourage industry, and foster merit, by teaching all public servants to look forward to promotion according to their deserts, and to expect the highest prizes in the service if they can qualify themselves for them.

3. To mitigate the evils which result from the fragmentary character of the Service, and to introduce into it some elements of unity, by placing the first appointments upon an uniform footing, opening the way to the promotion of public officers to staff appointments in other departments than their own, and introducing into the lower ranks a body of men (the supplementary clerks) whose services may be made available at any time in any office whatever.

MEETINGS FOR THE ENSUING WEEK.

MON. Royal Inst., 2.—General Monthly Meeting.
London Inst., 7.—Dr. A. W. Hofmann, "On Organic Chemistry."
Entomological, 8.
Brit. Architects, 8,—Mr. T. L. Donaldson, "An Account of the Louvre and Tuileries from their first erection to the present time, with a Description of Projects for their Completion, particularly the one by the late M. Visconti, now in course of erection."
Chemical, 8.

TUES. Horticultural, 3.
Royal Inst., 3—Prof. J. Tyndall, "On Heat."
Linnæan, 8.
Civil Engineers, 8.—Discussion on Mr. Yates's paper, "On the Advantages, of Uniformity in European Weights, Measures, and Coins."
Pathological, 8.

WED. Literary Fund, 2.—Anniversary.
London Inst., 2.—Mr. E. W. Brayley, jun., "On Physical Geography."
Medical. 5.—Anniversary Oration.
Society of Arts, 8.—Mr. R. B. Purbrick, "An Investigation into the relative merits of Purbrick and Yeates's Patent Sugar Pans, and those in ordinary use."
Geological, 8.—1. Mr. A. Selwyn, "On the Geology of the Gold District of Victoria, Australia." 2. Mr. M. Stephen, "On the Gems and Gold-Crystals of Victoria." 3. Mr. J. S. Wilson, "On the Gold and Cinnabar Regions of California." 4. Mr. C. Heapley, "On the Gold of Corromandel."
Graphic, 8.
Pharmaceutical, 8½.
Roy. Soc. Literature, 8½,
Archeological Assoc., 8½.

THURS. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
London Inst., 7.—Prof. J. Tyndall, "On Magnetism and Electricity."
Antiquaries, 8.
Royal, 8½.

FRI. Astronomical, 8.
Philological, 8.
Architectural Assoc. 8.—Class of Design.
Royal Inst., 8½.—Mr. C. Brook, "On the Construction and Uses of the modern Compound Microscope."

SAT. London Inst., 2.—Mr. E. W. Brayley, "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-Metallic Elements."
Royal Botanic, 3¾.
Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 23rd February, 1854.

Par. No.
4. Meteorological Observations—Abstract of Report of Conference.
57. Trade and Navigation—Accounts.
58. Committee of Selection—1st Report.
13. Bills—Improvement of Towns (Ireland).
17. Bills—Parliamentary Representation.
18. Bills—Bribery Prevention.

Delivered on 24th February, 1854.

41. Custom House Officers (London)—Correspondence.
55. Agricultural Statistics (Ireland)—Copy of Letter.
56. Education (Ireland)—Return.
60. Deficiency Bills—Return.
63. Corrupt Practices at Elections Commissions—Accounts.
21. Bills—Payment of Wages.
22. Bills—Absconding Debtors (Ireland).
23. Bills—Uniform Assessment.

Delivered on 25th and 27th February, 1854.

59. Bank of Issue—Return.
61. Slave Trade—Return.
62. Galway Extension Railway—Return.
64. Commissariat Estimate.
36. Woods, Forests, &c.—Abstract Accounts.
65. Committee of Selection—Second Report.
29. Education (India)—Return.
25. Bills—Valuation (Ireland).
20. Bills—Tenants' Compensation (Ireland).
Agricultural Produce in Ireland—Returns.
Public Offices—Reports and Papers.
New York Industrial Exhibition—General Report.
New York Industrial Exhibition—Special Reports of Messrs. Whitworth and Wallis.
Australia (Discovery of Gold)—Further Papers.

Delivered on 28th February, 1854.

9. Rent Charges (Ireland)—Return.
21. Public Works (Bombay)—Return.

SESSION 1852-3.

555. Health of the Navy—Statistical Reports; Part 2 (East India Station).
897 (2). Indian Territories—Index to Reports (delivered 25th February).

Delivered on 1st March, 1854.

32. Hops—Accounts.
67. Dover Harbour—Return.
72. Army—Supplemental Estimate.
24. Bill—Medical Practitioners (No. 2).
The "Tayleur"—Capt. W. H. Walker's Report.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, 24*th February*, 1854.]

Dated 7th January, 1854.

40. J. Ross, Keighley—Chocolate, cocoa, &c.

Dated 23rd January, 1854.

159. J. Rowlands, Birmingham—Fastening.
170. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Candles and wicks. (A communication.)

Dated 2nd February, 1854.

262. H. Watson, Newcastle on Tyne—Working brass and copper.

Dated 3rd February, 1854.

267. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Buildings. (A communication.)
269. C. H. Collette, 57, Lincoln's inn fields—Reducing ores. (A communication.)
271. J., S., and J. jun., Rogerson, Manchester—Textile fabrics.
273. W. and J. Longmaid, Beaumont square—Vegetable charcoal.
275. P. J. Meeus, Paris—Gutta percha thread.

Dated 4th February, 1854.

277. G. Mills, Glasgow—Steam vessels and steering.
279. J. Boydell, Smethwick—Reverberatory furnaces.
281. R. S. Newall, Gateshead—Ships' rigging.

Dated 6th February, 1854.

283. T. Sullivan, Foots Cray—Paper making.
285. B. W. Firth, Oldham—Breaks, &c., for railway trains.
287. A. L. N. Comte Vander Meere, Paris—Artificial whalebone. (A communication.)
289. J. B. Graham, Glasgow—Printing surfaces.
291. W. Neilson, Glasgow—Blowing engines

Dated 7th February, 1854.

293. J. W. Moseley, Heathfield, Norton in the Moors—Uniting glass and argillaceous cylinders, &c.
295. J. Elce, Manchester—Spinning cotton, &c.
297. H. Olding, Lambeth—Stoves and fire places.
299. A. E. L. Bellford, 16, Castle street, Holborn—Artificial stone. (A communication.)
301. A Pope, 81, Edgeware road—Crushing, &c., quartz, &c.
303. A. V. Newton, 66, Chancery lane—Bleaching. (A communication.)
305. B. U. Bianchi, Paris—Railway accidents.

Dated 8th February, 1854.

307. G. W. Knocker, Dover—Rotatory motive power by water.

Dated 9th February, 1854.

308. J. Perry, Leeds—Drilling machine.
309. J. Ramsbottom, Longsight, near Manchester—Railway hoist.
310. J. Dalton, Hollingworth—Printing bowls and cylinders, &c.
311. H. Moorhouse, Denton—Preparing cotton, &c., to be spun.
312. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Fire arms. (A communication.)
314. J. Samuel, Great George street, and A. W. Makinson, New Palace Yard—Drying flax, &c.
313. F. Voullion, 12, Prince's street, Hanover square—Silvering looking glasses. (A communication.)

315. G. Tournay, Newington Causeway—Motive power.
316. E. Boileau, Holford place, Clerkenwell—Printing surfaces.
317. F. M. Lyte, Torquay—Ascertaining depth of water.
318. P. J. Meeus, Paris—Planting seeds and depositing manure. (A communication.)

Dated 10th February, 1854.

320. D. Brown, Smethwick, and J. Brown, West Bromwich—Axles.
321. W. Duck and W. Wilson, London road, Southwark—Gas heating apparatus.
323. S. Hunt and T. Morris, Long Eaton—Covering buildings.
324. T. Allcock, Ratcliffe on Trent—Cutting straw.
325. B. H. Hine and A. J. Mundella, Nottingham, and L. Barton, Hyson green—Knitted fabrics.
326. J. Young, Glasgow—Gas making.
327. J. Rives, 8, Hotel Motay, Paris—Railways.
328. H. Warner, J. Haywood, and W. Cross, Loughborough—Knitting machines.
329. J. Johnson, Manchester—Preservation of life at sea.
330. H. Bridges, Bridgewater—Buffers.
331. J. Mitchell, Dyke head, Lanark—Forcing and distributing liquids.
332. W. Whiteley, Lockwood, near Huddersfield—Stretching woollen fabrics.
333. J. H. Johnson, 47, Lincoln's inn fields—Metallic pens. (A communication.)

Dated 11th February, 1854.

334. A. J. B. L. Marescheau, Paris—Locomotive engines. (Partly a communication.)
335. P. Buchan, Peterhead—Distance indicator.
336. G. Bird, Glasgow—Foundations.
337. J. Jennings, jun., Lorton—Brakes.
338. J. Getty, Liverpool—Plating iron vessels.
339. J. Rogers, New York—Lamp black.
340. J. F. D. de Bussac, 36a, Upper Charlotte street, Fitzroy square—Paving.

Dated 13th February, 1854.

341. G. Ayres, City road—Clip.
342. W. Brown, 113, Albany road, Old Kent road—Printing machinery.
343. T. Edwards, Birmingham—Dress fastening.
344. A. Chambers, Dundee—Mangles.
345. D. Campbell and J. Barlow, Accrington—Looms.
346. E. Clegg and E. Leach, Rochdale—Spinning, &c.
347. J. Cox, Wenlock road, City road—Paper knives.
348. S. R. Brown, Glasgow—Printing textile fabrics.
349. W. Macnab, Greenock—Steam engines.
350. J. Greenwood, Irwell springs, Bacup—Dyeing.
351. J. B., and E. Smith, Regent street—Bonnets.

Dated 14th February, 1854.

354. W. Scaling, Old Basford—Basket work.
356. C. A. Holm, 21, Cecil street—Propelling.
358. S. Perkes, Walbrook—Valve cocks.
360. G. Wilson, Sheffield—Axle boxes.

Dated 15th February, 1854.

362. J. Hossell, Regent road, Salford—Leather.
364. W. Asbury, Birmingham—Agricultural forks.
366. O. Barrett, 50, Wimpole street—Tobacco pipes.
368. J. Wren, Tottenham court road—Folding chair bedstead.

Dated 16th February, 1854.

370. F. Preston, Manchester—Flax machinery.
372. J. Bush, Derby—Locks.
374. T. Summerfield, Birmingham—Chromatic glass and glass faced bricks.
376. J. Pritchard, Portsea—Screw propellers.

WEEKLY LIST OF PATENTS SEALED.

Sealed February 24th, 1854.

1971. George Pollard, 64, Watling street, and George Mumby, of Hunter street, Brunswick square—Improvements in machinery or apparatus for the manufacture of envelopes.
1972. Alfred Augustus de Reginald Hely, Cannon row, Westminster—Improvements applicable to shades or chimneys for lamps, gas, and other burners.
1973. Alfred Swonnell, Kingston on Thames—An improved construction of tie for neckcloths and neck ribbons; applicable also to neck ribbons of caps and bonnets.
1979. George Davis, London—Apparatus for distinguishing genuine from counterfeit coin.
1981. Richard Archibald Brooman, 166, Fleet street—Improvements in the treatment of wool and silk, and in machinery for preparing silk so treated.
2230. Henry Jeremiah Iliffe, James Newman, and Henry Jenkins, all of Birmingham—Improvements in the manufacture of buttons.
2462. Alfred Vincent Newton, 66, Chancery lane—Improved construction of railroad carriage axle.
2518. Richard Restell, Croydon—Improvements in warming conservatories, greenhouses, and other buildings.
2884. William Thornley, of Clayton West, York—Improved manufacture of woven fabrics.
3036. Richard Waygood, Newington Causeway—Improvements in portable forges.

Sealed February 27th, 1854.

1987. William Hargreaves, Bradford—Improvements in machinery for preparing and combing wool, hair, flax, silk, and other fibrous substances.
2043. John Smalley, Bishopgate, Wigan, and Washington Smirk, of Ince—Improvement in railway carriage axles.
2071. Peter Armand le Comte de Fontaine Moreau, 4, South street, Finsbury—Improvements in lighting for consuming the carbon escaping combustion in ordinary flames. (A communication.)
2139. William Nash, Burslem—Improved mode of manufacturing china and earthenware articles on the lathe.
2197. James Leetch, of Birmingham—Improved method of constructing breech-loading fire arms.
2241. Caleb Bloomer, Gold's Hill, West Bromwich—Improvements in the manufacture of anchors.
2285. Manuel Fernandez de Castro, Madrid—Improved means of preventing accidents on railways.
2535. Frederick Albert Gatty, Accrington—Improved bath for heating and distilling.
2719. Benjamin Burleigh, King's Cross—Improved railway crossings as adapted to the double-headed rail and the ordinary rail and chair.
2758. Georges Edouard Gazagnaire, Marseilles—Improvements in the manufacture of nets for fishing and other purposes.
3763. Thomas Chambers and John Chambers, Thorncliffe Iron Works, near Sheffield—Improvements in kitchen sinks.
2947. Henry Milward, Redditch—Improved machinery for manufacturing needles and fish hooks.
2949. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn—Improvements in paddle wheels for propelling vessels. (A communication.)
2969. Thomas Vincent Lee, 4, Lockyer terrace, Plymouth—Improvements in the construction of certain machinery and apparatus for the manufacture of bricks and tiles.
2997. Frederick Crace Calvert, Manchester—Improvements in the treatment of napthas and other volatile hydro-carbons, and in the application of the same to various useful purposes.
3032. Chretien Guillaume Schonherr, Chemnitz—Improvements in bobbin machines.

Sealed February 28th, 1854.

2000. Joseph Cundy, 21, Victoria road, Kensington—Improvements in kitchen ranges and cooking apparatus.
2004. John Henry Johnson, 47, Lincoln's inn fields—Improvements in the preparation and application of gluten. (A communication.)
2010. Joseph Cundy, 21, Victoria road, Kensington—Improvements in gas stoves.
2015. Ezra Washington Burrows, Pentonville—Improvements in the construction of cranes and other machines for raising heavy bodies.
2019. Edward Smith, Love lane—Improved mode of manufacturing carpets.
2022. William Beckett Johnson, Manchester—Improvements in steam engines, and in apparatus connected therewith.

Sealed March 1st, 1854.

2154. Henry Meyer, of Manchester—Improvements in looms for weaving.
2286. Alfred Ely Hargrave, of York, and Ralph Richardson, of Hartlepool—Improvements in machinery or apparatus for printing.
2500. James Nasmyth, of Patricroft—Improvements in the pistons and piston rods of steam hammers and pile drivers, and in the parts in immediate connection therewith.
2710. William Mee, of Leicester—Improvements in the manufacture of braces.
54. Antoine Marie Edouard Boyer, Elie Ducros, and Ossian Verdeau, all of Paris—Invention of certain improved compounds to be used in dyeing.
56. The Reverend William Renwick Bowditch, of Wakefield, Yorkshire—Improvements in the purification of gas, and in the application of the materials employed therein.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854.				
Feb. 23.	3569	A Base Coin Detector	Fawcett and Butterworth...	Manchester.
„ 24.	3570	Portable Folding Camera............	Frederick Scott Archer......	105, Great Russell street, Bloomsbury.
„ 25.	3571	Fuller's Ice Pail for refrigerating Liquids	William Fuller	60, Jermyn street, St. James's.
„ 27.	3572	Improved Double Action Syringe or Garden Engine	William Streeton, sen.......	4, Hackney road, London.

Journal of the Society of Arts.

FRIDAY, MARCH 10, 1854.

THIRTEENTH ORDINARY MEETING.

Wednesday, March 8, 1854.

The Thirteenth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 8th instant, Henry Cole, Esq., C.B., in the chair.

The following candidates were balloted for and duly elected:—

Cooke, John	Parfitt, George John
Curtis, William Joseph	Pitman, Edward John T.

Previous to the reading of the paper, the Secretary called attention to some specimens of metallic lace exhibited by Mr. Carey, of Nottingham. This lace was produced by the ordinary Jacquard lace machine, in 4 feet widths, and at about half the rate of ordinary cotton lace. It was conceived that it would be found serviceable for a great variety of purposes, but chiefly in upholstery. Possessing almost the flexibility of bobbin-net, and being in pattern equal to the best production of machine made cotton or silk lace, and to much of the Honiton lace also, it would be found valuable for window blinds and curtains, as well as for decoration generally; whilst, being of a metallic body, it could be made to resemble either gold or silver, and upon becoming tarnished by lengthened wear, it might be reburnished and rendered equal in lustre to what it was when new, at a very moderate cost. The want of a metallic lace for striking electrotype patterns upon various articles of plate first suggested the making of these goods, and subsequently it has been adapted to many other objects.

The Paper read was:—

AN INVESTIGATION INTO THE RELATIVE MERITS OF "PURBRICK AND YEATES' PATENT SUGAR PANS," AND THOSE IN ORDINARY USE.

By R. B. Purbrick.

The manufacture of sugar from the juice of the cane not being very generally understood in this country, a few words on the *modus operandi*, as commonly conducted in the "Boiling house" of a sugar plantation, may not be out of place here by way of introduction.

The expressed juice, as it issues from the cane-mill is conveyed to a shallow vessel, made either of iron or copper, termed a "Clarifier" or "Racker," in which it undergoes a partial clarification, preliminary to its concentration in the so-called "Pans." On many plantations however, these latter vessels are called "Coppers," irrespective of the kind of metal of which they are made.

The cane juice, or as it is more frequently named—liquor—is heated in the clarifier to a little below the boiling point, and a small portion of crude lime, in the state of powder, is mixed intimately with it, by stirring. After simmering for a quarter of an hour or so, a separation takes place between the pure juice and the foreign bodies naturally and accidently combined with it. Although lime is the substance almost universally employed as a "temper," different chemical re-agents have been tried with variable success.

The clear liquor is now drawn off into the sugar pans. In these it is evaporated down to a state of thick syrup, and as soon as it has reached a proper degree of consistence, it is "skipped," that is removed off the fire into a shallow wooden vessel, termed a "cooler," where, as it gradually lowers in temperature, the greater portion becomes crystallized.

From the cooler, the mass of newly and partly-formed sugar, and that still uncrystallized is taken to the "Curing-house," and put, or "potted," as it is termed, into hogsheads having perforated bottoms, to allow the molasses to drain off.

When the sugar is sufficiently "cured," that is, dried, the hogsheads are inverted, (the heading having been first fitted in,) the bottoms taken out; and the perforations plugged—the *uncured* portion of the sugar is then removed, and its place supplied by some dry, and, after being well rammed, the bottoms of the hogsheads are again restored. The sugar is now ready for shipment.

Such is the general routine of operations, where the sugar-making is carried on with open pans only, but when the Vacuum pans are employed the concentrated juice or syrup, in place of being skipped into the coolers, is removed at an earlier stage of the boiling process to the vacuum pans, where it is finished. But in any case the boiling in open pans forms a necessary part of the manufacture, and consequently they are not entirely superseded, as some persons have erroneously stated, by their more costly rivals, the vacuum pans.

The number and size of the pans (that is the ordinary pans), together with the mode of hanging or setting them, varies in different colonies, and even on different plantations in the same colony.

The number usually employed is about seven or eight, and their size, as a general rule, proportionate to the extent of the plantation. On one making, say 300 hogsheads of sugar annually, the sizes would be about as follows:—One of 600 gallons, one of 500, one of 400, one of 300, one of 200, and two of 60 gallons each. The two last are called "taches," or "teaches," and sometimes the copper next in succession is termed the second teach. These three are not unfrequently made of copper, and the remaining pans of cast-iron, but very recently they have been constructed of wrought-iron plates.

The arrangement of the pans may be thus briefly described.

The two first teaches—where two are adopted—are ranged side by side, each having its own separate furnace. The other pans are disposed in a line at right angles to the two first teaches, the flues of which meet in that of the second teach, or first of the series of the larger coppers. This is comparatively a modern arrangement, and known under the appellation of the "Demerara plan." The object of it is to keep up a continuous fire under the larger pans, thus, whilst one teach is being emptied, and the fire beneath is withdrawn, the fire under the other teach is maintained. The advantage of this must be obvious, and will be more apparent when viewed in connection with another improvement, which, I believe, originated in Demerara also, namely, the substitution of the "dipper," or "skipper," for discharging the teach at one operation, instead of taking it out by small portions at a time with the "ladle." The dipper is a copper vessel made to fit, as nearly as possible, the two first teaches, having a valve in the bottom opening upwards. As soon as the syrup is ready for "striking," the dipper is lowered by means of a traversing crane into the teach, the contents of which pass into the dipper, which is then raised by the crane, and delivered into the coolers. By this simple contrivance a great deal of time and labour is saved; the fire under the pans is kept up without interruption, and the syrup preserves a uniformity of consistence.

The invention patented by Mr. Purbrick, and published

under the title of "Purbrick and Yeates' Patent Sugar Pans," is the joint production of himself and a sugar planter of 30 years' practice, Mr. Purbrick having been actively employed as an engineer for upwards of 10 years in the West Indies.

The distinguishing feature of these vessels consists in the peculiarity of their shape, which is attained by substituting portions of a *cylinder* for that of a *sphere* to form their bottoms, the latter being the shape of the bottoms of the common pans. An unbroken metallic surface is thus presented to the action of the flame and heated air—*undulating* longitudinally, and *horizontal* transversely.

The additional effective heating surface obtained by this modification is very considerable, and will be palpably evident on inspecting a plan of each description of pan, drawn to one scale, and placed in juxta-position.

But, before going more fully into the relative advantages offered by the two systems in question, it may be as well to explain the figures.

Figure 1, exhibits a plan of a portion of a set of the Patent Pans, Figure 3, a transverse section of one of the large pans in its place; and Figure 2, a view of the two first teaches—one in section, with its corresponding furnace, and the other partly in section, and its furnace partly in elevation.

Figure 4, is a longitudinal section of a set of the Patent Pans, with stoke-hole, furnace, and flue, and a steam-boiler at the extreme end of it.

Figures 5, 6, and 7 show the pans in ordinary use, and the construction of the arches between them, in plan and section.

Fig. 1.

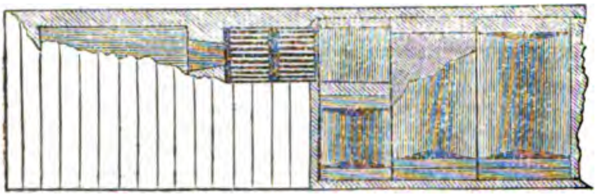


Fig. 2.

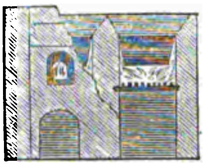
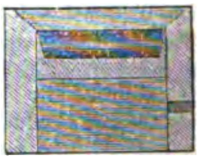


Fig. 3.



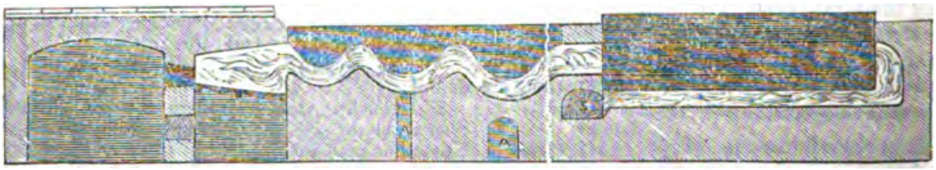
On reference to Figure 1, it will be noticed that a portion of the arch over the stoke-hole, and that over one of the furnaces, together with the corresponding teach and part of the second teach, are removed, for the purpose of showing the position of the feed-mouth and furnace-bars, and the construction of the brickwork beneath the pans, the nature of which, it is presumed, will be sufficiently intelligible as to render a precise description unnecessary.

The parts shaded black, represent a first and second teach, and the first in the series of the large pans, the remainder to complete, a "set" of which would be merely a repetition of *it*, unless, however, it be deemed preferable to increase the capacity of the pans as they recede from the teach which has been the usual practice with the common pans In that case the dimensions would be enlarged longitudinally only, so as to preserve the side walls of the flue parallel throughout.

In figure 2, a part of the front wall of the furnace is broken away to show the manner in which the two first teaches are hung. The furnace-mouth and ash-pit of the furnace to the left are shown in elevation.

Figure 3 represents the second teach in section, as regards the brickwork, and in elevation, as regards the pan itself. A similar representation would apply to a transverse view of all the larger pans.

Fig. 4.



The details of figure 4 do not require a very minute description. The general arrangement of the pans, furnaces, flue, and steam-boiler, will speak for itself. This last appendage is merely brought into the drawing in order to illustrate the mode in which the waste heat, after leaving the pans, might be—and sometimes is—appropriated to great advantage.

The teaches and larger pans are shaded black, and figured, P 1, P 2, P 3. The two first are an outline or section in the direction of the flue of those vessels: the other is in elevation. The bottom of the flue is made to conform very nearly to the bottoms of the pans. By this means the flame and heated air are caused to impinge on the entire surface of the horizontal portion of the bottom, and an equable radiation of heat from the brickwork maintained to a considerable extent throughout the whole length of the flue. The letters A, A, denote the position of the ash-pits underneath the pans, which are entered by an opening in the external wall, one of which is shewn under the last large pan. The adjoining opening (marked S) represents the flue leading from the steam-boiler to the chimney. According to the arrangement here shown, he steam-boiler must be regarded only as an auxiliary. If no other be used, then the connection between it and the pans must be effected in a different way. A furnace and fire-bars will, in that case, be required for the purpose of getting up the steam before the fire is put to the pans, and to assist in case of a deficiency from that source. But where the megass (the fuel employed to boil the cane-juice) is abundant, dry, and in good condition, and the steam-boiler of proper form and dimensions, sufficient steam will be generated by the waste heat from the flue of the sugar-pans to work a steam-engine proportional to the requirements of the plantation. This is not a matter of conjecture, as the patentee of the invention under consideration has demonstrated it on a large scale with the common pans, and the same object is secured in a superior degree with the patent vessels, inasmuch as they admit of greater compactness, whereby the steam-boiler is brought into closer promixity to their furnaces.

Figures 5, 6, and 7 relate exclusively to the common pans. Figure 5 is a plan of two of the larger ones; the vessels themselves shaded black, and surrounded by either tiles or sheet-lead. This appendage, *incident and indispensable to the common pans*, is a costly and troublesome affair. Its object is twofold,—to form a

watertight and smooth covering to the brickwork beneath, and also to afford additional stowage for the cane-liquor whilst boiling. A portion of this covering is represented as taken off, and a part of the brickwork removed, in order to show the position of the jambs of the arches between the pans, and the manner in which the flues are carried round them.

Fig. 5.

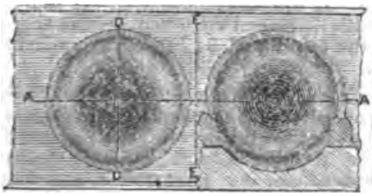


Fig. 6.

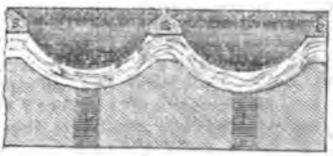


Fig. 7.

Figure 6 shows the pans in elevation, and the brickwork in section. That of the flue is taken along the line A, A, on the plan, and is supposed to be constructed on the improved plan of hanging the pans, namely, by giving to the bottom of the flue the shape of the pans themselves, or nearly so; consequently it will present along its central line an undulating appearance as here shown. The parts lettered B, B. B, are the crowns of the arches between the pans, and C, C, the ash pits.

Figure 7 exhibits a combination of sectional views. The foremost taken in the line D, D, and the more distant one taken along the line E, E, a portion of the pan being visible through the opening in the arch, and the remainder being represented by the dotted lines.

The more important advantages to which the patent pans lay claim, are threefold:—

1st. A large increase in the amount of effective surface for heating liquids.

2nd. A more favourable condition as regards the disposition or appropriation of that surface.

3rd. Considerable economy in the setting or hanging of the pans.

Now, the first of these positions admits of easy proof, as it will be found by calculating the relative area of the surface exposed to the action of the fire by the two descriptions of pans, occupying the like space, and of equal capacity, that the proportion will be nearly as 8 to 5 in favour of the patent vessels.

The second position we have laid down does not admit of the like mathematical demonstration, but a glance at the mere *form* given to the patent pans, especially when viewed in the transverse section, will, it is conceived, convince any competent judge in such matters of the soundness of the principle upon which it is based, and justify the superiority to which it lays claim. The horizontal is admitted, on all hands, to be the most favourable condition which can be presented to the action of the fire for heating liquids. And this, it will be seen, obtains to a much larger extent in the patent pans than in the common ones, even those of the most approved shape.

The saving both in labour and materials in the setting of the patent pans will be self-evident, on a bare inspection of the figures. It will be seen that the most difficult and expensive portions of the brickwork required to hang the common pans are altogether dispensed with. No arches between the pans, no circular walls to form the flues around them, both of which must be constructed chiefly of fire-bricks and fire-clay, and by skilled workmen. Nothing more is required to hang the patent pans than two straight parallel upright walls of common brick and mortar, with the exception of the first teaches, which, from their proximity to the furnace, must be set with fire-proof materials. Then there is another considerable saving, by doing away with the "tiling and leading," which forms a very prominent feature, not only in the first hanging of the pans, but periodically, and frequently many times repeated during the sugar making season, in the item of plumbers' work. Taking this and the item of brickwork together, it may be fairly stated, that at least 50*l.* will be saved in the first hanging alone. What the amount may be in the shape of repairs, and renewals of plumbers' and bricklayers' work, it is difficult to estimate, but every practical sugar planter knows that it figures but too conspicuously in the estates accounts.

But the economy does not stop here. The interruptions to which the boiling-house operations, and many others, are subject, consequent on the falling in of the arches between the pans, the melting of the lead, &c., &c., constitutes a serious loss. In addition to that sustained on the score of labour, we must take into the account the waste of unmanufactured cane juice and of unground canes, which for the purpose of converting into sugar, each soon becomes alike useless. And this sometimes take place to the extent of a hogshead of sugar.

The sources of waste and annoyance will be obviated by the adoption of the patent pans. But in the event of any stoppage by accident to the pans, their removal and replacement can be effected with so much ease and despatch as scarcely to affect the regular progress of the boiling-house work. The junctions of the pans may be either by rivets or screw-bolts, and their separation is the work of a few minutes; and, being constructed of wrought-iron, they can be more readily and efficiently repaired.

Another point remains to be noticed, and it is one of no mean importance in connection with the patent pans—and that is, their superior evaporating qualities, by which the duration of the boiling process is very much reduced; and thus ensuring a better quality of sugar as well as an increased quantity. The deterioration which takes place in the quality of the sugar, and the large increase of molasses produced by a sluggish evaporation, the loss of time and waste of fuel are facts well known to, and their value only to be duly appreciated by, the practical sugar maker.

DISCUSSION.

The CHAIRMAN said, that it seemed to him that the alterations suggested rested upon the question of cheap construction, as he did not gather that the sugar was better made by the proposed pans than by the old ones. He should, however, be glad to hear the opinion of some of the gentlemen present, technically acquainted with the subject, as to the practical value of these pans.

Mr. DALE (of Thames-street,) remarked that there was scarcely sufficient novelty in the plan to provoke much discussion, as the only improvement consisted in the pans being oblong in place of being round. No doubt a great saving of brickwork was effected; but he thought there was not sufficient improvement to induce the planters to introduce the new system in place of the one which had been so long established.

Mr. PURBRICK explained that the old round pans required a large surface of lead or tiles in the fixing. He did away with that, and also with a large mass of brick work between and surrounding the pans. His plan simply required two straight walls of brickwork, on which the pans were laid, and as they were made to but against each other there was a continuous metallic surface exposed to the fire from one end to the other,—whereas in the common pans there was a mass of brickwork between the pans, which

was excessively liable to get out of order, besides taking off a great deal of the heat. The setting of the pans would therefore not only be less costly in the first instance, but there would be less outlay required for repairs. Under the old plan the arches were continually falling down; he had known them to fall two or three times during a crop.

Mr. SIEMENS remarked that the new plan was simple in construction, and judicious in the arrangement of the pans, which were placed one after the other, so as to obtain a more extended surface within the same compass. That appeared to be the chief merit claimed by the patentee, and there seemed to be very little doubt upon it; but the other question—that of obtaining a superior quality of sugar—was not adverted to in the paper. He thought perhaps the new pans were less calculated to maintain the syrup in a liquid state and crystallize it than the old ones, for this reason,—the cane-juice was not a perfect liquor, but syrup-like, and if the fire impinged on any part of the surface with energy, the liquid would be heated to a degree which would prevent its crystallizing afterwards. It appeared to him that in the new pan the flame would impinge upon parts of the surface in such a way as to make the heat given off, especially in those portions, too great. He thought the system of evaporating by fire an objectionable one. On the Continent the sugar was prepared from the more costly beet-root, almost to the exclusion of cane-juice, and there such a thing as a furnace for boiling the liquor was not known, steam heat being invariably used. The object of Haworth's vacuum pan was no other than evaporating at a lower temperature; but it was not necessary to have the costly apparatus of the vacuum pan in order to effect that. In British Cayenne two sugar planters seemed to have moved one step in advance by combining an open evaporating pan placed over a very mild and diffused fire, with a paddle-wheel dipping into the liquid, and exposing it through its rotation to the action of the dry trade-winds. There appeared to be a decided improvement in the new pans, but he submitted that in using pans of any kind fire ought not to be employed directly, but through the medium of steam, as the latter would not heat a degree beyond its own temperature. Besides, there was another convenience,—a series of pans could be heated, and it would allow of one pan being discharged whilst the steam was applied to another series, so that great advantage thereby accrued in a large establishment from the use of steam. He called attention to this apparent defect in the old process in general, and which appeared to be equally applicable to the new pans.

Mr. PONTIFEX remarked, that the pans in use in Java were oblong, and were joined together without the intervention of brickwork; the only difference between them and those described by Mr. Purbrick was that, in some instances, the bottoms were convex instead of concave. The vacuum pans were very little used until the liquor was much evaporated. Therefore the common steam pans might be used until it arrived at the point beyond which the liquor would be injured, viz:—212 degrees, the common heat of steam—then the vacuum pan was employed for finishing the sugar.

Mr. PURBRICK agreed with Mr. Siemens, that the use of steam as a heating agent was preferable to the application of fire direct; but his object was to induce the planters to adopt a less expensive mode than steam; for if an apparatus cost only 10*l.* more than that now in use it would not be adopted. He, therefore, wished to introduce a plan which, at the same cost, would accomplish the object cheaper and better—better, because if the liquor was a long time simmering they would not get good sugar. By this plan, he got one-third more surface in the same amount of space as the common pans occupied, by means of which he obtained increased evaporation.

Mr. MARTINEAU said, the heating surface was increased, but he doubted whether in evaporating a great deal of the heat was not wasted. They wanted the heat completely under the evaporating pan, and it had been very truly remarked that the heat would flow up between the pans rather than underneath them; and it would be difficult to attain uniformity in the heating without the use of steam. It was also necessary always to have the pans filled with liquor or they would become charred at the top, as the heat would be between them and not at the bottom.

Mr. AUSTIN said, although not versed in the theory, he had a practical acquaintance with the subject, having for 6 or 7 years had the management of a property in the West Indies. It appeared to him that in discussing a question of this nature, they must treat it as a matter of art and its claims to utility. It had been shown to be not quite so original as the patentee might have imagined; but practically the invention seemed likely to be of value. In the West Indies, up to the present day, the "teaches" were fixed exactly like those placed before him,—the round pans with leaden or tile tops—and he saw at a glance the advantages attending the new plans. There would be far less consumption of fuel, which was a most important consideration; for, in many parts of the country, they were so short of fuel that they were obliged to use the squeezed cane, which was dried in the sun. There was a difficulty even in getting a sufficient supply of that fuel, and therefore any plan which admitted of a smaller amount of fuel would prove a useful invention. A gentleman had suggested that steam should be applied to the manufacture of sugar as a heating agent. He did not know how that might be, but he knew in many parts of the West Indies there was a difficulty in getting water for the ordinary purposes of life much less for the supply of a steam boiler. Although on a few of the richer estates there were steam mills for crushing the cane and expressing the liquor, yet in the majority of cases windmills were employed for that purpose. The steam for the boiling of the sugar itself would involve intricate and expensive machinery, which unfortunately too many of the estates would not be able to incur. He thought there were practical advantages to be derived from the new plan; in fact he remembered, in keeping the accounts of the estate to which he had tended, that there was a constant expenditure in rebuilding the brickwork during the crop season, by which the operations were very seriously delayed. This would be avoided by the flue passing continuously under the "teaches," and would cause the manufacture of the sugar to be carried on with much greater economy than under the old system.

Mr. SIEMENS considered the arguments as to the scarcity of water and fuel to be in favour of evaporating by steam. If the whole of the heating power was put under the boiler, and as much power taken out of the steam as was necessary, and then the steam turned under the evaporating pans, it would be the most economical way of obtaining heat from fuel; and on the other hand the whole of the water would be returned to the boiler, so that, strictly speaking, no additional water would be used. That was a point which had been overlooked.

Mr. REEVES, as practically acquainted with the powers of evaporation for chemical purposes, gave the preference to the round pans, as in his experience they had answered better than those of any other form.

A vote of thanks having been passed to Mr. Purbrick for the paper which had been read,

The Secretary announced that at the meeting of Wednesday next, the 15th inst., a paper would be read "On Machines for Dressing Flour, with a description of a New Machine for that purpose," by Mr. T. Egan.

Gallery of Inventors.

Portrait received since the last announcement—

FREDERICK AUGUSTUS WINSOR.

INSTITUTE BOOK ORDERS.

The following statement shows the amount of the Book Orders for the last month:—

FEBRUARY ACCOUNT.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Bacup, Mechanics' Institution	15	11	0	12	0	9
Bicester, Literary Institution	14	7	6	10	13	9
Chesterfield and Brampton, Mechanics' Institute	1	0	6	0	14	4
Chippenham, Literary and Scientific Institution	6	1	6	4	11	11
Derby, Railway Literary Institution	7	2	0	5	10	1
East Retford, Literary and Scientific Institution	0	17	1	0	14	1
Gateshead, Mechanics' Institute	3	8	4½	2	13	4
„ Washington Chemical Works, Reading Institution and Library	7	7	4	5	10	3
Holmfirth, Mechanics' Institution	11	9	6	7	15	11
Lancaster, Church of England Instruction Society	2	2	0	1	12	7
Leiston, Mechanics' Institute	2	5	5	1	16	7
London, Bank of England Library and Literary Institution	11	12	6	8	1	10
Macclesfield, Useful Knowledge Society	21	2	0	16	1	8
Masham, Mechanics' Institution	6	8	0	4	16	5
Northallerton, Institute	6	10	0	4	8	3
Northamptonshire, Religious and Useful Knowledge Society	6	8	0	4	5	2
Pershore, Mechanics' Institution	5	8	6	3	18	9
Romford, Literary and Mechanics' Institution	7	8	6	5	2	5
Royston, Mechanics' Institute	10	12	6	7	18	4
Sevenoaks, Literary Institution	3	4	9	2	9	6
Shaftesbury, Literary Institution	2	9	0	1	18	0
Tiverton, Literary and Scientific Institution	3	14	6	2	15	3
Welshpool, Reading Society	29	7	9	22	0	5
Woburn, Literary, Scientific, and Mechanics' Institution	4	10	6	3	12	9½
	£190	8	8½	141	3	4½

Showing a total saving of £49 5s. 4d., or an average discount of about 26 per cent.

The following summary shows the extent to which Institutes have availed themselves of this arrangement since it came into operation last autumn:—

	No. of Institutes.	Full Price.	Reduced Price.	Average Discount. About
November Account.	25	145 15 0	106 6 5	27 per cent.
December Account.	20	196 10 5	149 17 8	23½ „
January Account.	18	174 11 7	130 16 5	25 „
February Account.	24	190 8 8½	141 3 4½	26 „

During the last week, and the early part of the present one, book parcels have been sent to all the Institutions in Union. To by far the greater number the Society were enabled to forward a copy of Mr. W. A. Provis's "Account of the Construction of the Conway and Menai Suspension Bridges;" and the Council feel it due to that gentleman to thank him publicly for his very liberal donation.

PUBLIC LIBRARIES ACT.

The following Circular and Queries have just been issued to the Town Clerks of all boroughs included in the Act 13 and 14 Vict. Cap. LXV. It is requested that Members and others will aid the Council in obtaining the returns requested, and otherwise in promoting this enquiry.

Society of Arts, Manufactures, and Commerce,
Adelphi, London, March 2, 1854.

SIR,—It is well known that many difficulties exist in the working of the 13 and 14 Vict. c. LXV. called by its short title the "Public Libraries Act," which, in a very great degree diminish the value of its provisions.

The Council of the Society of Arts are about to take steps for procuring an amendment of the Act, so as to render it more efficient for the purposes it has in view; and they are anxious to collect the experience of those who have a practical knowledge of the subject.

I am therefore desired to lay before you the accompanying questions, and to beg the favour of your reply.

Should there be any points not covered by the questions, on which you can give information or make suggestions, the Council will be much gratified at receiving them.

I am, sir, your obedient servant,
P. LE NEVE FOSTER, Secretary.

QUESTIONS PROPOSED MARCH 2, 1854.

1. Is the "Public Libraries Act" in operation in your town?

2. Was it adopted with or without opposition? What is the number of Burgesses entitled to vote in your Borough? How many polled in favour of, and how many against adopting the provisions of the Act?

3. Has any building been provided and opened, or when will it open; what are the conditions of admittance, and what are the numbers frequenting it?

4. Have any unsuccessful attempts been made to adopt the provisions of the Act?

5. Do the provisions of the Act unnecessarily impede its adoption, and if so, how?

6. Is the prohibition against the re-proposal of the Act within two years desirable? Is the amount of rate sufficient?

7. Ought the purposes of the rate to be limited to the provision of the Building and other objects specified in the Act, or extended to the purchase of specimens, books, &c.

8. Should a maximum rate be fixed by the Act, or should the amount of the rate be left to the option of the rate-payers?

9. Would a central metropolitan Museum by means of correspondence and interchange of specimens conduce to the prosperity of local Museums? Would it be desirable that arrangements should be made by which the duplicates and superfluous specimens in the British Museum, Museum of Department of Science and Art, Kew Museum, &c., should be distributed to Provincial Museums?

10. Would it be desirable to have collections of works of Art and illustrative series of new discoveries and inventions systematically circulated through provincial Museums, and whether by arrangements with the central Museums in London, or otherwise?

11. Is there any public Library or Local Museum in your town? If not, has any attempt been made to establish one? Are there any facilities for obtaining loans of books? Are there any circulating libraries, and if so, what classes make use of them? What is the general feeling in your town with respect to the establishment of a public Library, Museum, or Reading-room?

PAPER FROM WOOD.—A patent for the manufacture of paper from wood-fibre has been taken out by Messrs. Watt and Burgess. It is said to be equal to any writing-paper now selling at 7d. per pound. The cost of production is stated to be somewhat under £25 a ton—more then £12 less than the price of rag-paper now in use.

ORGANIZATION OF THE CIVIL SERVICE.

The Dean of Hereford has just published a letter on this subject, addressed to Lord Aberdeen. After speaking of the great encouragement such a scheme offers to education, he says he has long been of opinion that this class of patronage might be made a means of encouraging education and self-improvement, and at the same time of promoting in a very high degree, the efficiency of the public service; his remarks, however, are confined chiefly to that part of the scheme which relates to the lower departments of the public service; and as such, having reference to those classes of society in the improvement of whose education his experience of late years more particularly lies.

It is the object of this plan to secure the best men for the public service, by a competing examination of all candidates for civil employments, within the sphere which it is intended to embrace.

In looking at this plan in all its bearings on society, and the mode in which it would be carried out, he is persuaded such an organization of the public service, if established by legislative enactment, would do more to attach the lower and middle classes of society to the institutions of their country, than any social reform which has taken place in the present age; and not only this, its effects would be felt in all our educational institutions, from the universities downwards to the lowest parish school.

Had any organization of this kind taken place some years ago, our grammar and other endowed schools would not have been in the condition in whish they now are.

That the examination should be a competing one, extending over the different departments of the civil service, and not a mere examination as to the competency to pass in a particular department, is most important and absolutely essential for the successful carrying out of this scheme.

The Dean considers that this principle will give satisfaction to all classes of society, and when carried out by a Board of Examiners of high character, and quite independent of the several departments of Government, presents no difficulties whatever which cannot be overcome. To make such examination effective, it will be necessary that it should be conducted by persons skilled in the art of xamination, presided over by some one of high official rank, who from his experience and knowledge of the civil service, would supply that element in the Board of Examiners, which would be essential to its success.

The moral effect on society, and more particularly on that class in life from which the selection for these lower offices is made, is very different whether it be made on the principle of political favouritism, or on that of fitness for the post, after a competing examination, which shall completely test the merits and qualifications of the candidates. With such encouragements before them, boys will remain at school to a greater age than at present, and their parents will take the chance of getting them into the civil service.

Education labours under great difficulty in this country among the lower classes, for want of inducements; unless a parent means his son to be a schoolmaster, at present he has no inclination, or motive, to keep him at school beyond ten or twelve years of age; and there is no motive whatever to adults of seventeen or eighteen to pursue their education after they leave school. The proposed scheme will remedy this. Not that every parent who has a promising son, will expect that he is to be placed in the Board of Customs, or the Excise, although I dare say this will be raised as an objection against the plan. The merit of this scheme is, that the road to such situations will be open to all; that all will have something to hope for, and nothing to complain of; those who do not try, cannot grumble, and those who do try and fail, will feel the principle on which they were rejected so fair, that they would meet with no sympathy if they did.

This scheme holds out great encouragement to young men in the lower and middle classes to self-improvement after leaving school, and will induce many to avail themselves of libraries and similar institutions intended for secondary instruction, which are now rising up in all our towns. This feature in such a measure is of considerable importance to the public, and will add greatly to the usefulness of that class of institutions, and from this source many able and efficient men, would be added to the various departments of the civil service.

In carrying out such a plan, the School Inspectors under the Committee of Council might be of great assistance.

Pupil teachers, with great advantage to the public and themselves, might be allowed to compete for these offices.

The mode proposed for ascertaining the moral character and state of health of the applicants, seems to offer as great an amount of security on this head as is possible; and a far better guarantee as to moral fitness for the discharge of their respective duties in all grades of the service, than has hitherto been attempted.

Another advantage to society would arise. Such a system would lead to the same principle of promotion being adopted in civil situations, both high and low, connected with our corporate and other towns; the large public companies, looking to their own private advantage in securing the best and most competent servants for their work, would be guided by similar principles.

The tendency of the principles involved in such an organisation of the service, is to a high moral standard in public matters; and money, thus indirectly devoted to the purposes of education, is better spent for its own objects, as it provides better servants for the public, which would be far more efficiently served, and at less expence than it has hitherto been. Such an organisation will gradually lead to a higher state of morality in everything which concerns the daily occupations of life, and will, eventually, correct that feeling in the public mind, which attaches so low a standard of morality to the present mode in which this kind of patronage is supposed to be administered; and the government of the country, instead of labouring under the imputation of setting a bad and corrupting example in administering this class of patronage, would be looked up to as giving it on principles of the highest moral kind; offering encouragement to good character, intelligence, and worth, among all classes, and binding together the different links of society by the strongest social ties.

The advantages of such a measure would not thus be confined to increasing the efficiency of the service, and to its effects on education.

No stop can be put to bribery of a pecuniary and more direct kind in elections, leaving this class of patronage to be disposed of as it has hitherto been. No distinction can be made between the two. The moral principle on which it is attempted to get rid of the former, makes it equally binding to take such steps as may prevent and put an end to the latter. To suppose that patronage is necessary for the purposes of carrying on the Government of a country, is an alternative which it would be most painful and humiliating to be obliged to adopt; and it is high time to show that there is no kind of necessity for adopting it; but, on the contrary, infinite and extensive evil in it.

The way in which this system influences many of the voters, is absolutely ridiculous, and gives rise to a want of principle in the exercise of the franchise, for which some remedy ought to be found.

As an instance of this absurdity, a clergyman gave the Dean the following:—"A farmer, one of his parishioners, told him he had a son who was very sickly, and not at all fit for a farmer, but he thought he would do very well for a place under Government, and asked his advice how to proceed in trying to get him one. He told him, the usual way was, to apply to the members for whom he had voted, when their party happened to be in power. To this the farmer, guided by shrewdness, the result of observation,

replied, he always thought so, and at the last election he split his votes, and gave one on each side, in order to be sure, whichever party was in power. No doubt the next post carried a letter to the member on the right side, describing his son as well qualified for any place he could get him."

The Dean then relates that a member of the House of Commons told him he wished to send a boy, the son of his gamekeeper, to a school in the neighbourhood, in order to qualify him for a place in some Government office. Finding the youth was not sent, the Dean asked him the reason; to which he answered—Oh! the boy happened, very fortunately, to carry the game-bag for Lord ——, when he came down on a shooting party, and having told him of my wishes for him, he said, send him at once, and I will give him a place—I suppose he can write tolerably well, and will soon learn the rest; but my friend added, he thought the boy would have been better for a little more schooling, but so good an opportunity was not to be lost."

There is no doubt that hundreds of appointments are made on no other principle than this.

By such appointments, and those made on the grounds of electioneering jobbery, and with very little reference to qualification, the service suffers, both in efficiency and in character.

Compare with this, the manner in which it is proposed to recruit the service in all its departments, and in all grades of office—by providing for its supply a thoroughly efficient class of men, chosen by a proper and competing system of examination, as to character, qualifications, and attainments, conducted by a Board of Examiners of the highest character, responsible to the public, and the future prospects of those appointed to the service depending entirely on the industry and ability with which they discharge their duties. Between the two, the country will not hesitate which to choose.

That such a measure is practicable, is shown from the working of the system of examination conducted by the Education Department of the Committee of Council, and such a scheme when fairly carried out in the lower departments of the service, will disperse all over the country many thousands of well-educated persons, whose influence in their families, and on those around them, will be of the most beneficial kind; in this respect greatly multiplying and adding to the same effects produced by the pupil teachers and certified teachers in our schools—each being a centre of civilization to those around him. To be making Parliamentary grants in aid of education, and at the same time, to administer the patronage of these situations without reference to merit or fitness, is putting forward a principle without practising it.

He refers to the examinations for certificated masters and for pupil teachers as having done much in preparing the public for such a plan. A few years ago, the advantages of having a well-qualified master in a parish school were little understood, and no feeling existed in favour of examinations. Those who had a schoolmaster to elect, would have placed little value on a certificate of merit, however high, from the Committee of Council. The result has been that the demands for certificated masters is at this moment, notwithstanding all our training institutions, far beyond the supply.

The Dean points to his own experience as justifying the view he takes. He has been in the habit of recommending boys of character, when opportunity offered, to situations or which by their education and industry they have fitted themselves.

Mr. John Wood, the liberal-minded Chairman of the Inland Revenue Board, acting on these principles, has placed three young men on the Excise on his recommendation.

He objects to the proposition advanced by some that a certain number of appointments ought to be appropriated to the sons of public servants, on the ground that such a provision narrows the field of selection; and success in this class, would not carry with it the same credit as in the general field of competition, and the end would not be beneficial to those for whose advantage it is intended, whilst it certainly would be prejudicial to the public interests.

The Dean considers that in all respects, as regards examination of candidates, there are no obstacles whatever in the way of working out such a system to the satisfaction of the country, and the benefit of the public service.

In the examination for the lower departments of the service, the examiners being first satisfied as to character, state of health, &c.—good reading and writing—knowledge of arithmetic—being able to write correctly from dictation—to express themselves well in a letter, would form the principal parts of the intended examination; and perhaps it might be well to add a *viva voce* examination as to general intelligence, or in some subject such as the history of England, not so much for the sake of the information as with the view of testing the intelligence of the candidate.

It would be the duty of the examiners to choose the best from among those who offer themselves; and as education advances, they would find increasing intelligence amongst the competitors. Such examinations are not intended merely as a test of book-learning, but of ability, common-sense, and of character. Although many will entertain fears lest the examination should be of too bookish a nature; a public Board of Examiners, even were it to err in this direction at first, would very soon find its way into a proper course by practical experience.

The Dean suggests that it would be well to require of each candidate for such situation, a certificate of character and conduct while at school, which, independent of its direct use in judging of his fitness as a candidate, would lead to the practice of registering the character of boys during their latter years at school, with a view to its being useful to them in after life. It would have a wholesome influence on school discipline, and would also establish a connexion between this class of appointments and the village school, of great service to the cause of Education; shewing, both to parents and children, that time well spent and attention given at school, united with good conduct, has a marketable value, which may afterwards be turned to good account. This is a lesson which they want to learn, and of which, from past experience, they have no idea.

The direct advantages of such a system are:—That the Civil Service would become a most popular and attractive profession, and would, therefore, enlist in its ranks a large proportion of the rising talent of the country, which would lead to a discharge of official duties in all the grades of office, much more efficient than could be attained in any other way, and to a higher moral standard of action in the business of life.

But independent of these advantages, great as they are, there are many of an indirect kind not less valuable—the encouragement which such a plan gives to education and self-improvement without raising up religious disputes, and without expense to the country—its putting an end to the existing evils of patronage—the example of high public principle shown in the mode of appointing and promoting civil officers—all these are considerations which cannot be measured by any amount of money, but give a national importance to this measure which it is impossible to over-estimate.

The higher parts of the Civil Service would open out an honourable career to a large class of Students in our Universities, who would, both from taste and acquirements, be better fitted for this service than for some of the other professions, over which it would have an advantage, in offering a greater certainty of success and of self-maintenance at an early period of life. From the advantages which the Universities offer, not only as regards instruction, but also in the training of their well-organised

systems of examination, the tendency of such a measure will be to increase the number of students, and to enlarge the sphere of usefulness of the Universities themselves. Many young men would then go, who have now no motive for doing so; and the lectures of the Professors of Political Economy, of Moral Philosophy, and of other Professors, bearing on the qualifications for some departments in the Civil Service, would assume a character of practical usefulness which, at present, does not belong to them.

Viewed in all its bearings, the Dean considers this as one of the most important national measures for social improvement ever contemplated and brought before the public; if established by legislative enactment, it would do more for the advancement of education than a Parliamentary grant of many hundred thousands a year, or than any bill for the extension of it, which the country is prepared to adopt and carry cut at the present time: it would do this, also, on the best possible grounds, by holding out motives of an honourable kind to all classes of society to educate themselves, and would show them that good character, knowledge, industry, and fitness for the discharge of official duties, in whatever rank of life, would meet with their appropriate reward.

Surely such a measure would be most acceptable to the public, and would meet with a cordial support from all the advocates of an improved education throughout the length and breadth of the land; and it is the Dean's firm belief, that the very best education bill which Government could bring forward, or which could be passed just now, at all likely to work well throughout the country, would be one for carrying out this proposed scheme for the re-organisation of the Civil Service. Certainly no administration could give a stronger proof of earnestness in the cause of education, than the bringing forward such a bill.

NEW YORK INDUSTRIAL EXHIBITION. (a)

Special Report of Mr. George Wallis.

The task of reporting on the textile, metallic, vitreous, and ceramic manufactures of the United States, and on the position of art education as applied to manufactures and the copyright of designs, was assigned to Mr. George Wallis, who has followed the classification adopted at the great Exhibition of 1851.

In the introduction Mr. Wallis states that he has "sought rather to test the results of trans-atlantic skill by its own aims, and the peculiar requirements of a people whose wants it is its honourable ambition to supply, than to institute unfair comparisons, which could only lead to conclusions of no practical value." The report then alludes to the effect of foreign competition in the markets of the world, as tending to repress rather than to encourage originality or departure from the ordinary stock forms—but says that "manufactures, as a *result* must, however, be carefully separated from machinery as a *means*, since, in the latter, originality of conception, construction, and application is one of the most remarkable features in the progress of industry in the United States." These early difficulties were increased by the isolation of manufactories, which, preventing mutual aid, rendered it imperative that each should be complete within itself, and that everything connected with its operations should be manufactured on the premises, or kept in stock to such an extent as should ensure a continuous supply. Hence have arisen the many ingenious labour-saving machines, to supply the great want of skilled labour; and the successful application of mechanical means to one manufacture has been stimulative of their application to another. The versatility of the people is also very remarkable; it is where sound and systematic education has been longest, and in all probability, most perfectly carried out, that the greatest manufacturing developments are to be found.

"As there is no apprenticeship system, properly so called, the more useful the youth engaged in any industrial pursuit becomes to his employer, the more profitable it is for himself. Bringing a mind prepared by thorough school discipline, and educated up to a far higher standard than those of a much superior social grade in society in the old world, the American working boy developes rapidly into the skilled artizan, and having once mastered one part of his business, he is never content until he has mastered all. Doing *one* mechanical operation well, and only that one, does not satisfy him or his employer. He is ambitious to do something more than a set task, and, therefore, he must learn all. The second part of his trade he is allowed to learn as a reward for becoming master of the first, and so on to the end, if he may be said ever to arrive at *that*. The restless activity of mind and body—the anxiety to improve his own department of industry—the facts constantly before him of ingenious men who have solved economic and mechanical problems to their own profit and elevation, are all stimulative and encouraging; and it may be said that there is not a working boy of average ability in the New England States, at least, who has not an idea of some mechanical invention or improvement in manufactures, by which, in good time, he hopes to better his position, or rise to fortune and social distinction......In regard to the social position of the artizan classes, it should be stated that though the rate of remuneration is relatively higher than in England, yet the hours of labour in every industrial occupation, and especially in factory labour, are much greater.........The laws of partnership of the United States, which encourage the formation of manufacturing companies, with limited responsibility in the non-managing shareholders, has led to much greater development of the industrial resources and skill of the country, than, in its circumstances, could have resulted under mere private enterprise for many years to come. It must, however, be evident to every person who carefully examines the joint stock system of manufactures, as it now exists, that it is by no means favourable to the ultimate and permanent success of manufacturing establishments generally, and, though there are many highly gratifying and honourable exceptions, those are the best managed where there are the fewest proprietors, and, consequently, the smallest number of individual interests to consult." "As a means of developing the individual powers and natural resources of a new country, encouraging self-reliance, promoting economical habits by affording opportunities for the safe and profitable investment of small amounts of realised capital in the hands of the industrious classes, the value and importance of a limited responsibility in the law of partnership cannot be overlooked or over-rated."......"No fact appears more certain than that the manufacturers of the United States take especial care to be well informed on all European improvements, either in machinery or in processes; and, as traditional methods have little hold upon the American, as compared with the English artizan, processes holding out the least promise of improvement are quickly tested, and, if found worthy, are adopted either in their integrity or with such modifications as the ingenuity or wants of those applying them may suggest or require." There are comparatively very few Englishmen engaged in the industrial establishments of the United States, owing it is believed no less to the excessive hours of labour than to the sudden variations in the temperature, which are very trying to the majority of English workmen. German workmen are largely employed in many departments of industry, and in the metal trades the processes are frequently more German than English. It is thought however that the whole number of English, German and French would not reach up to one-fifth of the artizan class.

"The cotton manufactures of the United States appear to hold the first position in the industrial productions of that country, alike as regards extent and value; and, although their operations are chiefly centralised in New England and Pennsylvania, yet there are only seven of

(a) Presented to the House of Commons by command of her Majesty, in pursuance of their Address, of February 6, 1854.

the thirty-one States of the Federal Union in which the spinning or manufacture of cotton is not carried on. * * * By a return printed in a report of the Superintendent of the Census of the United States for 1850, 1054 establishments for the manufacture of cotton goods are stated to be in operation, consuming 641,240 bales of cotton and manufacturing goods to the value of about £1,000,000 sterling per annum. The number of persons employed in the cotton manufactures of the whole of the States was 33,150 males, and 50,136 females. The New England establishments are conducted upon a similar principle to the large cotton factories of Great Britain, and spinning and manufacturing are carried on as one concern. This, however, is not the characteristic of the mills, as they are. in many instances, employed in spinning only; and in Pennsylvania, Georgia, and Tennessee, yarns are produced chiefly for the purposes of domestic manufacture by hand, which still obtains in many parts of the older States of the Union." Domestic weaving is, however, gradually giving way, and the power loom is being generally introduced. The produce of the mills at Pittsburg, Pennsylvania, and at Richmond, Virginia, is then described; and it is stated, in regard to the cotton manufacture in the cotton growing States, that "in Tennessee spinning would appear to be the rule, and manufacturing the exception. In Georgia and North Carolina equal attention is paid to both; whilst in Virginia, South Carolina, and Alabama, the manufacture of piece goods is decidedly more extensively carried on than spinning only. Slave labour is said to be largely used, with free whites as overseers and instructors." The James River Mill, and that belonging to the Manchester Company, both at Richmond, Virginia, are next described. At the latter place there is a patent "speeder," the advantages of which "are a greater speed, a more even roving, and a bobbin of any desirable size, which never becomes spongy in the winding." In the New England States, the manufacturing towns of Lowell, Manchester, and Lawrence, strikingly demonstrate the results of the energy and enterprise of the manufacturers. Lowell, though it has been founded barely thirty years, is now a city containing nearly 35,000 inhabitants. It has thirty-five mills, which produce 2,139,000 yards of piece goods per week. "The average per spindle is 1¼ yard per day, the medium produce of a loom being, in 14's 45 yards, and in 30's 33 yards per day. * * * * * * The average wages of females, clear of board, is about 9s. 6d. sterling per week, whilst the wages of males show an average of about £1 2s. sterling per week. The average hours of labour per day, *exclusive of meals*, is 12, the mills commencing at 5 a.m., and closing at 7 p.m." The goods produced are quite equal, and are sometimes superior, to similar articles manufactured in England. The manufacturing establishments at Lawrence, Massachussetts, comprise all the advantages derived from the experience gained at Lowell. The weekly production of the Atlantic cotton mills there is 299,262 yards of piece goods. At Manchester, New Hampshire, there are two manufacturing companies—the Amoskeag and Stark Mills—the former comprising four mills, and the latter two, with the requisite boarding-houses. The monthly production is 1,597,166 yards, and the amount paid in wages averages £6,000 per month. Among other articles manufactured at the Stark Mills are the seamless grain bags, and an article—a species of drilling, known as leather cloth—which is now coming into extensive use as a substitute for morocco.

"The bags are 45 inches long, and are manufactured of various qualities and weight. The warp is a double one, and by the construction of the loom, the filling, or weft, traverses both sides, uniting the warps at the edge, instead of producing a selvage. The loom is a perfect self-actor or automaton, so to speak; it commences the bag, goes on until the requisite number of picks has been thrown in to make up the length; it then closes the bottom, throws in a number of picks as a *tab*, and then commences another bag. All that the weaver has to do is to attend, in the usual way, to the perfect working of the machine, and cut out each bag, as from their thickness any quantity accumulated on a cloth beam would be an incumbrance to the machine. * * * * * The bags are hemmed round the top, or mouth, by sewing machines, each machine being attended by one female operative, and the average work of each is 650 bags per machine per day. There are 126 of these seamless bag looms at work in the Stark Mills. The average make is 47 bags per loom per day, and the speed about 130 picks per minute." Pillow cases and bed-bolsters could be as easily and profitably produced by this loom as grain bags. An adaptation has lately been applied to the weaving of cotton hose for fire engines. The experimental loom produced 1000 feet of hose per day, at a cost of 3½d. per foot. It is a perfect duct, and requires no oiling. An improvement in the carding engine is in operation at the Stark Mills. It consists of a series of circular saws with very fine teeth, set round a cylinder. It throws out an immense quantity of dirt which escapes the ordinary carding machines. The monthly production of the Stark mills is 1,046,138 yards of piece goods, and 109,544 of seamless bags. At Nashua, in New Hampshire, there is also a considerable development of the cotton manufacture. The Hadley Falls company, at Holyoke, Massachusetts, have already two mills in operation, at one of which sheetings are manufactured, at the rate of about five tons per day, and at the other there are "30,700 spindles for No. 90 yarn, this being the finest number spun in the United States. It is manufactured into lawns, or jaconetts, chiefly for printing. * * * * There is only one other mill for the manufacture of lawns in the States. This is at the Portsmouth Steam Mills, Portsmouth, New Hampshire. Here there are 26,000 spindles driven by steam power, the yarn being No. 90's, as at Holyoke. Another mill for this class of goods, the Pacific Mills, Lawrence, Massachusetts, is in the course of erection, and will be in operation shortly. * * * The manufacture of ginghams is now carried on to a large extent, particularly in South Hadley, opposite to Holyoke, and at Clinton, Massachusetts. The goods are admirable, though light in quality, of good dye, and the colours generally put in with good taste." These are regularly sold at from 6½d. to 8d. per yard retail. The manufacture of cotton bedquilts by a method included in Bigelow's patent for the manufacture of Brussels carpet by the power-loom, is also carried on at Clinton by the Lancaster Quilt Company. Tickings are extensively manufactured, and often form a department in the large cotton establishments in the New England States. The display of cotton goods in the Exhibition at New York, as illustrative of this branch of industry, was, on the whole, a satisfactory one.

The woollen manufactures of the United States occupy the next position in extent and value to the cotton, though it is questionable whether the wool used is of American growth, as that wool, from the length of its staple, is not well suited to the manufacture of broadcloths. For cassimeres and stuffs it is peculiarly well adapted. "At present German, English, and Australian wools are imported for the manufacture of certain classes of goods; but, according to the report in the census of 1850, the largest proportion of imported wool comes from Buenos Ayres and the neighbouring States on the Rio de la Plata. This is of a coarse and cheap variety, costing from 3½d. to 4½d. sterling, per pound." In 1850, twenty-four of the thirty-one States of the Union, and the district of Columbia, had establishments engaged in some department of the woollen manufacture; and whilst the cotton manufacture is located more exclusively in the Eastern States, the woollen manufacture is extended in almost equal proportions over the whole of the Middle States, and extends itself into the western regions and towards the south. A similar difference in the modes of manufacture to that noticed in the cotton trade is again shown,

in this department of industry in the two States of Pensylvania and Massachussets: "a very large proportion of the produce of the woollen mills of Pensylvania is yarn only, a large amount of this being consumed in home manufacture for domestic use, or in the weaving of mixed goods and carpets by hand, and this, in addition to the home-spun woollen yarns worked up with the cotton yarns produced for that purpose. The total number of persons employed in the various establishments for the manufacture of woollen goods in the United States for 1850 was 22,678 males, and 16,574 females. Wages, as in the cotton trade, vary very much in different localities, but the average appears to be slightly lower than in that department of industry in the New England States, whilst it is higher in Pensylvania. In the Western States the increased average is considerable." At Lowell, the Middlesex Company produce 24,000 yards of cassimeres, and 3,000 yards of broadcloths per week; some of the latter have a cotton warp, and sell for about 7s. per yard. At the Bay State mills, Lawrence, Massachusetts, the monthly production is "40,898 yards plain flannels, 3,962 yards twilled flannels, 10,159 yards fancy cassimeres, 6,770 yards satinettes, 1.030 yards broadcloths, 568 yards beaver-cloths, 1,703 yards felted carpets, 2,752 yards felted beavers, 1,540 yards felted linings, 1,464 long shawls, all wool, and 5,970 square shawls. The flannels are all either dyed in fancy colours or printed. The latter are chiefly block work, although cylinders are used for some styles. * * * The felted fabrics manufactured are noticeable as being produced by a different method to that adopted by any other establishment. * * * The felted lining cloth, composed of gauze and a comparatively small quantity of wool, is a new and useful fabric. The wool is felted down upon the gauze as a back, and the substance obtained by this means is much greater than the quantity of material employed would warrant any one to expect. When the back or gauze surface is concealed by the use of the fabric as a lining, the result, as regards appearance, is very satisfactory, and it is said to wear well, as the two materials are fairly united by the felting process." In the manufacture of woollen shawls a fringing machine is used, by which the threads constituting the fringe of each shawl are twisted to a proper tension. It does the work usually performed by hand, and accomplishes as much as 10 females. At the Manhan Manufacturing Company's Works, Waterbury, Connecticut, an excellent imitation of "petersham" and felted carpet fabrics are also manufactured. The woollen manufactures of Maryland are considerable, and at Baltimore a large quantity of a coarse quality of fulled linseys are manufactured chiefly for negro clothing. In the State Penitentiary of Maryland, at Baltimore, coarse garment plaids, of good make, are woven by hand by the prisoners. The produce of these looms is about 500 pieces per week. The Jacquard has been lately introduced into use in the production of figured patterns in fancy cassimeres.

"The manufacture of silks is comparatively exceptional in the United States, and notwithstanding many vigorous attempts, not only to establish the manufacture, but to raise the raw material on an extensive scale, little has resulted except in the production of sewing and fringe silks and twist." The growth of raw silk never appears to have been realised, though many portions of the United States are well adapted to the growth of the mulberry tree, and the healthy development of the silkworm; but the active habits of the people are not adapted to the work of looking after the cocooneries, or managing filatures for reeling the silk. The States best adapted to the growth of silk are Virginia, Ohio, Kentucky, and Tennessee. At Economy, Pennsylvania, the growth of silk used to amount to 3000 lb. weight per annum, but it is now abandoned. At Wheeling, Virginia, and at Newport, Kentucky, American silk, with the addition of foreign silk, is manufactured into a variety of goods, but not to any extent. The cost of native silk is from 5 dollars to 5 dollars 50 cents. per pound, whilst imported silk can be purchased for much less, notwithstanding a duty of 15 per cent. At Philadelphia one firm tried the production of ribbons, but failed to make them at such a price as to command a market; whilst another firm in the same city only make them when they have nothing better to do, and for the purpose of keeping their hands in full work. "The most important enterprise in the silk trade now prosecuting in the United States, is that of the application of the power loom to the weaving of brocatelles at the Eagle Mills, Seymour, Connecticut. This establishment has only recently commenced work. The machinery is beautifully constructed, and works with great accuracy. The looms carry revolving shuttle-boxes, and are all made upon the premises. Ten looms are in full work, five preparing, and ten more in the course of construction. The goods manufactured are 48 inches in width, of firm fabric, but defective in the surface. This arises more from the evident inexperience of the weavers, than any defect in the mode of production. These weavers are females, selected from carpet manufactories, and, of course, lack the practised eye of the silk weaver in detecting defects. Cotton is chiefly thrown in for the back, though linen is sometimes used. The designs are French in character and superior to those generally produced in such fabrics. The price varies from 14s. to 19s. per yard; but it must be taken into account that the width is twice that of similar goods as generally manufactured in England. A very excellent adaptation and improvement upon the French and English "reading off" and card-cutting keyboard machine is used in this establishment, the invention of the superindendent."

The manufactures of flax seem at present to be altogether exceptional, whilst hemp is employed to a considerable extent in most of the large cities of the United States in the production of ropes and cables, tarred and untarred. Flax is largely grown in some of the States for the seed, for oil making, and the straw is at present thrown away. In some parts of Pennsylvania and Ohio, it can be bought for from 19s. to 24s. per ton. A new machine for the preparation of flax by a mechanical rather than by a chemical operation, has recently been brought out. The straw is passed through and crushed by rollers, to which a difference of speed is given, so that the fibre is torn to pieces and reduced to a cotton wool, the woody fibre falling out in the process. The flax, thus prepared, can be sold without further preparation to paper makers at about 1½d. per pound. A chemical process is applied simply to bleach, after the separation.

"The manufacture of leather in its various forms and qualities, and its making up into articles of use, has grown into an important branch of the industry of the United States. Differing in no important point with the methods used, or the purposes to which it is appliedi n Europe, the manufacture of leather into saddlery, harness, portmanteaus, &c., is carried on in almost every town of any importance, and the trade is conducted on a similar principle to that usually adopted in England. * * In portmanteaus, valises, and other articles for use in travelling considerable ingenuity in arrangement is often shown." In artificial hair there are some clever contrivances. In 1852 the fur trade of the State of Minnesota is said to have reached about 170,000*l* sterling. The leather cloth previously alluded to "is a most perfect imitation of morocco, by the application of a preparation of caoutchouc, or gutta percha, to the surface of plain woven or twilled cotton cloth. The surface is corrugated in imitation of morocco, and is coloured and varnished so as to present all the external appearance of that kind of leather. The elasticity is perfect, showing no tendency to crack, and so far as time has at present tested its durability, this appears to be satisfactory. Its cost is less than one-third that of morocco, and, from the width of the cloth, it cuts to much greater advantage in the covering of articles of furniture, for which, as well as carriage linings, particularly railway carriages, t is coming largely into use. * * *

It is now stated, that after a trial it has not been found to answer for the lining-band of hats, to which it was at first applied, as the colouring matter is decomposed by wear, from the surface not possessing the absorbent quality of leather."

The manufacture of paper is carried on to a great extent in most of the Atlantic States, and in that of Massachusetts particularly. "The whole production is by machinery, not more than one or two houses making hand-made papers. The machines are all adaptations and improved applications of Fourdrinier's invention, modified to suit the wants or ideas of the manufacturer, who would appear to be the stationer also, as far as the making up of the paper into reams, quires, and packets is concerned and its distribution to the retail trader, even in the ornamental form in which it reaches the public. In this respect the general commercial dealings in paper are very different to those of England, and the function of the wholesale stationer is an exceptional one in the United States." The materials used are chiefly raw cotton and mill waste. At the Ivanhoe Mills, Paterson, New Jersey, there are ten vats or engines for grinding the materials for making the paper; each vat containing pulp sufficient for making 180 lbs. weight of paper, instead of 120 lbs. only, as is usually the case in England. The bleaching of the materials is effected in a number of air-tight chambers of large size, built of stone, with iron doors, so constructed that no chlorine can escape. At the Carew Paper Mill, South Hadley, Massachusetts, the pressing is chiefly effected with steam-heated cylinders covered with paper, through which the sheets pass in quick succession, and a very good surface is obtained. Here there is also a contrivance for cutting the sheets. "A knife is set in the wheel round which the paper revolves as it leaves the machine; a flat board, swinging on a pivot, comes in contact with the edge of the knife at stated intervals, thus measuring off the sheet and cutting it at the same operation. The sheets fall into a receptacle below the revolving cutter, and are removed at stated intervals as they accumulate." In 1850, the number of newspapers, of all kinds, published in the United States, was 2,800; the circulation of these amounted to 5,000,000: and the number of copies printed annually amounted to 422,600,000. At a type foundry in Boston, Massachusetts, "machines for casting the smaller bodies of type are in regular use. A pump is used for forcing the melted metal into the mould, and a workman turns out 90 brevier type a minute, and smaller ones at a more rapid speed." Stereotype plates in gutta percha have been extensively experimented upon in the United States; and at the Smithsonian Institute, Washington, the titles of the books to form the catalogue having been set up in any convenient number, a matrix is made therefrom, and a stereotype plate cast in gutta percha. This is sawn into the number of titles of which it is composed, and the alphabetising is accomplished.

In the operations of printing and dyeing the fabrics manufactured of cotton, wool, and a combination of the two, the manufacturers of the United States have been largely aided by the emigration of artizans from Euprope; and though the introduction of calico printing has been one of no ordinary difficulty, it now appears to be fairly established at Messrs. Dunnell's Print Works, Pawtucket, near Providence, Rhode Island. In cotton both madder and steam prints are produced, jaconets and cambrics, under the generic name of lawns, form a considerable portion of the madder work. In steam prints as many as ten colours or tints have been produced in one pattern: the average is four, and the result is, as usual, more satisfactory. The machines are run at a much greater speed than in England. At these works "an ingenious contrivance for untwisting the cloth as it comes from the dye-house is in successful operation, by which one boy does the ordinary work of six men. This untwisting machine receives the cloth through a wooden funnel, similar in shape to the hopper of a mill, into a trough of the width of the fabric, forming an inclined plane. The boy attending to the machine assists the opening of the cloth, which is chiefly effected by an undulatory motion, applied as it descends from the funnel; this partial spreading out is rendered more complete by the passage of the fabric over the curved edge of a piece of wood, across which it is drawn on the ascent by the inclined plane or trough, which conducts it to a series of wooden rollers with spiral edges of brass fixed in their surface. These open the cloth completely, in a similar manner to the iron spreading roller attached to every calico printing machine. An adaptation of a French method of using the chloride is adopted. This is effected by passing and wringing the cloth in its open state through the chloride, or 'chemick,' as it is called in England, and then washing out by passing over three large wooden cylinders placed above each other, over which an abundant stream of water flows as they revolve." At the Merrimack Print Works, and the Hamilton Manufacturing Company, Lowell, Massachusetts, madder colours only are printed. At the former there are twelve machines employed, printing in from one to four colours, and the daily produce is 40,000 yards, or about 8,000 pieces per week. At the latter, from one to six colours are used, and the weekly work of five machines is returned at 110,000 yards. At the Manchester Print Works, Manchester, New Hampshire, both cottons and mousellines de laine are printed; ten machines are employed, and these print from single-coloured madders up to eight colours in steams, six colours being the average in mousellines de laine. At these works "a folding machine, for grey cloth, is attached to the dyeing machine of the scouring room. It consists of a swing frame, with rollers, through which the cloth passes. As the frame swings on a pivot, by which it is attached to the upper part of the frame, it lays out the cloth as it descends from the rollers in smooth and even folds, ready for carrying to the printing machine, instead of allowing it to be crushed into an unsightly mass as it passes from being dried in the grey." An invention has lately been brought out for economising the weight of metal in the copper-rollers or cylinders used in printing calico. The roller itself is made very much thinner, and there is then inserted therein another roller with a grove or slit running longitudinally, into which a mandril is fitted, with a metal notch running down the slit, thus expanding the internal roller to the full circumference of the inside of the copper shell, and rendering the whole sufficiently firm and solid for use in the machine.

The manufacture of carpets is carried on to the greatest extent in the New England States, where the weaving may be said to be altogether by power. Hand-loom weaving, however, is still the chief means of production in the States of Pennsylvania, Delaware, and Maryland, and the manufacture consists of two and three ply Kidderminster, Venetian, and a little Brussels. The out-door or domestic system, as it may be called, prevails to a considerable extent, although there are factories in which looms are set up. By this system a weaver takes out work from the manufacturer, and the master weaver, or "boss," as he is called, employs other weavers to work—probably three or four looms—in a shed attached to his own house. The wages of the working weavers average about £2 1s. 8d. per week. The Lowell Manufacturing Company, Massachussetts, employ 200 power looms, manufacture two and three ply ingrain carpets, and produce 25,000 yards per week. "The most interesting carpet manufactory in the United States is, without doubt, that of the Bigelow Carpet Company, Clinton, Massachusetts. In this establishment the manufacture of Brussels carpets by power is fully and completely carried out, and a fabric manufactured, which, for evenness of surface, fineness, and strength of make, is of a most unexceptionable character. There are 30 power-looms always in full work, weaving 5-frame Brussels carpet. The production of each is from 20 to 24 yards per day; in special cases 32½ yards are manufactured. Pieces of 60 yards each, of the

widths ½, ¾, and 1 yard, constitute the usual make. The "fit" or "register" of the patterns is of the most accurate character, thus giving a great advantage in the making up. The weavers are all females, one attending each loom." An experimental loom, for the manufacture of velvet pile Brussels carpet, produced about 15 yards per day. "By an arrangement of the wire, a knife-blade, with the edge uppermost, forms one end, and when this is drawn out by the action of the machine it cuts the pile. In order to secure the face threads, two picks had to be thrown into the back for one at the face of the fabric, and the problem in the course of solution was the relative proportion of these threads."

The manufacture of ready-made clothing forms an important item in the industry of the people in the large cities of the States, such as New York, Boston, and Philadelphia; females are more largely engaged, and, on the whole, better paid for their work than they are in Europe, still the condition of the needlewomen, especially the shirt-makers of New York, is not satisfactory. Cincinnati, Ohio, is a great central depot of ready-made clothing for the Western markets. The various sewing operations have latterly been carried on by sewing machines, of varied construction, by which one person can do as much work as ten ordinary needlewomen; and by those machines in which the needles acted vertically, any character of seam required for ordinary clothing, either in right lines or curves, can be sewn. The successful action of this machine is further exemplified in the manufacture of boots and shoes, so far as the stitching of the upper leathers is concerned. "The Waterbury Knitting Company, Connecticut, manufacture cotton drawers, under shirts, and merino wool knitted articles. By a regulation of the directors, however, strangers are not allowed to see the machinery; but judging from the character of the goods, the machines are, in all probability, either of French construction or upon the same principle as the circular looms of Jouve or Gillet" The establishment of Messrs. Hotchkiss and Merriman, Waterbury, affords an illustration of the extent and mode of operation of the making up elastic webbings into clothing, suspenders, gaiters, &c. "They spin the cotton yarn in one factory where 200 persons are employed, manufacture the buckles and metallic mountings in another, and at a third factory the elastic webbing is produced; the threads of caoutchouc for intermingling with the warp being prepared on the premises, the weaving of the weaving being effected by power. About 150 persons are employed in the latter factory, where the webbing is afterwards cut to the requisite sizes for the various articles into which it is made up, the leather trimmings punched out to the proper forms, and then assorted into convenient quantities with the necessary metallic appendages. The materials thus assorted are distributed in the villages and farm-houses around, to be made up by females, in many instances at their hours of leisure from domestic employment, and by others as a means of obtaining a livelihood." The boot and shoe trade of the United States is of a very extensive character. The various portions are cut out to the requisite sizes, and put up with all the necessary trimmings in sets. They are then sent to be "fitted" for the maker —that is, the various parts of the upper leathers are stitched together, now mostly by the sewing machine in which the needle acts vertically. "The neatness, accuracy, and strength of the stitch is superior to hand work. The upper leathers thus 'fitted' are sent to the 'binder,' who finally prepares them for the 'maker,' by whom they are soled and heeled. Being complete in make they then go to the 'trimmer,' whose work consists in punching the string holes, stringing, and putting on buttons, and in ladies' shoes, bows, rosettes, &c. Soles are cut out by machinery. A knife with a curvilinear edge is set in a frame and worked with a treadle after the manner of a lathe. By a lateral motion of the machine it can be adapted to the cutting of any requisite width of sole, and being once fixed to a given width, the process of cutting is very rapid, and material is saved by the leather being cut at right angles to the surface, instead of diagonally as by the ordinary knife." At Havrehill there are 129 of these machines employed in cutting sole leather. At Messrs. Horstmann's manufactory, at Philadelphia, there is a "machine with a circular knife, so arranged as to cut the thread on the diagonal. The double fringe as it leaves the loom, being either run off the beam or placed upon a roller for that purpose, is divided much more exactly than it could be by hand, and at so rapid a speed as scarcely to admit of a comparison with hand labour. Any width of fringe can be thus cut, the machine being so constructed as to be easily adapted thereto."

(*To be continued.*)

Home Correspondence.

NATURAL PRINTING.

Sir,—In your Journal of Friday last I read the "summing up" of your industrious correspondent, Dr. Branson. Giving that gentleman full credit for his exertions in the cause—retaining my suspicions of the Austrian application of lead having been got from the English Patent for the ornamenting of metals by pressure—being perfectly satisfied with the position assigned to me in my application of Britannia metal as the best substance yet found from which to take impressions, direct or for transfer purposes—though I do not agree with Dr. Branson as to the limited number of copies which may be procured from a plate of that material. I am only sorry that Dr. Branson should have in his "deliverance" expressed himself as follows, as regards my opinion of the calling in lithography to aid in the multiplication of impressions. He says:—"This step is claimed both by Mr. Aitken and myself. It is clear, however, from the allusion to it in Mr. Aitken's paper, and from his non-allusion to it previously, that he does not regard the process very highly." I contented myself with pointing out the defects which I knew to be incident to the transfer process. The experiments made by me were upon transfers got from the most delicate objects, which had printed admirably clear and distinct from the plate, owing to the depth of the lines of the impression regulating the intensity or delicacy of the several parts of the object represented. Transfer lithography differs from copper-plate printing in so far as the impression is received from a series of ink lines which lie upon a plane, which receive the ink in proportion to the breadth of said lines. A number of lines coming together, as in the down of certain plants, the lower part of a feather, &c., will not therefore be preserved in all their delicacy, beauty, and distinctness. The tendency to block up in printing, to blur, or become indistinct, is increased when such delicate lines cross each other. The test I subjected the process to was one of the severest kind. I knew that if it passed that ordeal the rest was plain sailing. I succeeded as far as I expected; and in my paper I gave my experience as follows, as to what might be expected, viz.:—"That where lines of an exceedingly delicate kind occur, as in the down of a feather, the stone will not print a great number of impressions clear, but will be apt to block. Where the markings are clear and distinct in the object copied, the result will be more successful, though a want of solidity in the lines (a defect inherent to transfer lithography) may be anticipated." I deem it right to be cautious in expressing opinions as to first experiments; and I think it is well not to rush into print before due consideration, as in a week thereafter I might be compelled, in justice, to enter a "disclaimer," having found out another party had done the same thing before. "My non-allusion" to it previously in a public manner may be attributed to the consideration, that I do not entertain the same opinion as Dr. Branson, viz., that the public should at once be put in possession of the result

of my cogitations, unless I choose. I incline to favour the opinions of your sensible and talented correspondent, Cosmos, in matters of the kind. I don't believe that a man should give up everything he knows for the benefit "of a nonentity—the public." But to set Dr. Branson at ease as to my opinion on calling in lithography to aid in the multiplication of impressions from natural objects, in a letter to a gentleman in London, distinguished for his scientific knowledge, I wrote, on the 7th December last, as follows:—"Natural printing will only achieve its complete triumph when united to transfer and chromo-lithography; and, had I time to experiment, I am sure I could produce more brilliant and successful results than anything yet exhibited." My earliest objection to the Austrian and English coloured representations of flowers, &c., arose from their transparent character, and want of solidity; the veins of the leaves and flowers only printing, indicating a transparency the reverse of natural. My first impulse, upon getting possession of a specimen, was to wash over the leaves and flower with a flat tint of the proper colour belonging to each; the result was completely satisfactory, and demonstrative of the importance of a ground tint previous to the printing of the details.

This strengthened me in my idea as to the union of lithography with the natural printing process. The opinion expressed by me on the 7th Decr., already alluded to, I still retain, subject to the exceptions pointed out, which, however, do not apply with equal force to all the objects which may be copied by natural printing.

In justice to myself, and in correction of the rather hasty conclusions drawn by Dr. Branson—conclusions quite unwarranted by any expressions of mine—I shall feel obliged by the insertion of this.

I am, Sir, yours faithfully,

W. C. AITKEN.

Birmingham, 19, Broad street,
28th February, 1854.

QUADRANGLE OF BRITISH MUSEUM.

Sir,—The interest which your Journal and Society must necessarily feel in the extension and efficiency of an Institution, so kindred in purpose with your own, as that of the British Museum, induces me to place at your disposal the enclosed letter, addressed to the Trustees, in reference to the application of two highly valuable and interesting Inventions, one of which, if I am rightly informed, your Society has already been the means of bringing under public notice.

WM. VOSE PICKETT.

March 1st, 1854.

"*To the Trustees of the British Museum.*

"My Lords and Gentlmen,—Having learned that it is in contemplation to enclose the quadrangular area of the British Museum, with a view to rendering the *space* available for the uses of the establishment, I feel it my duty to direct your attention to a most effectual means of converting, at comparatively small expense, the whole of that area into one grand unobstructed apartment, decidedly the grandest in Europe, and at the same time to secure an additional basement apartment of the same extensive superficies.

"The means to this end are, 1st., by the application of a Domed Roof, with perfect ventilation, on the Chain Tension Net principle, which would require no other support than the walls of the present building as they now stand.

"The framing of this roof, remarkable for the simplicity and beauty of its engineering properties, forms a continuous and pendentive net work of wrought and cast iron, the entire of which is covered with thick sheets of glass, water-tight, corked, and seamed, like the decks of ships.

"The inventor of this mode of roofing is ready or responsible to undertake the construction and erection, while the skill and ability of your own architect (Mr. Sidney Smirke) would doubtless, with most satisfaction, be available in rendering the details and final decoration of the work harmonious with the general effect and style of the edifice.

"The second application is that of a transparent or semi-transparent casement, having abundant provision within itself for carrying off dust and water, as also for ventilating the under surface. The framing, composed entirely of iron, is somewhat similar to, but a great improvement upon, the old French method of parquette flooring, and being raised on iron uprights to a level with the hall and principal floors of the Museum (thereby answering the double purpose of floor and ceiling), would add this magnificent addition of space to the principal floor, and secure an equal or nearly equal amount of useful accommodation in the basement floor beneath.

"Should there be a disposition to adopt these plans, and any further or pressing necessity be found to exist for the acquisition of a greater amount of available space, it would remain for your architect to consider how far a series of galleries round the walls of the quadrangle (somewhat similar to those of the museum in Jermyn-street, the City Coal Exchange, or your own King's Library in the Museum), might, in his opinion, be brought into consistent keeping with the general spirit and effect of the surrounding structure.

"To yourselves, my lords and gentlemen, it will doubtless be obvious that I have only discharged a duty incumbent upon me in addressing these particulars to your consideration. I have no personal interest in the matter, further than the respect I have reason to entertain for the invention, and the desire which, in common with every right-feeling individual, I cannot but entertain for the perfection, both in grandeur and usefulness, of so interesting and invaluable an establishment as that of our National Museum.

"I have the honour to be,
"With the highest respect,
"Your obedient servant,
"WM. VOSE PICKETT.

"58, Jermyn Street, St. James's Street,
"February 28th, 1854."

ENGLISH AND AMERICAN INDUSTRY AND INVENTION.

Sir,—We have of late heard much in England of the extraordinary progress of our American brethren in invention and machinery, and the report of Mr. Whitworth was said to confirm these rumours to such an extent, that our all but ruin as a manufacturing nation was partly predicated. Now, however, that the report itself has appeared in print, we find that, like most alarms, it is quite groundless; and that if it were not an absurdity to suppose that any nation could damage another nation in its legitimate industry, the United States have far more to fear from England than England has to fear from the United States. To one circumstance, and which is far from an advantage in all cases, the United States are indebted for their chief progress, the insufficient number of their population. Food was more plentiful than mouths, and men could not be found, as in England, to waste their existence in drudgery. And this gave the stimulus to machinery. Another advantageous circumstance was, the absence of any Excise to impede progress. The operation of these circumstances was very clear. Plenty of food, preventing the possibility of starvation, by want of work, and men were very enterprising, scarcity of men made machinery a necessity. And these were conditions directly opposed in England and the United States. In England, the scarcity of food kept the population in a condition of pauperism and fear, so that so far from being enterprising, a man dared not remove beyond the bounds of his parish, and this last circumstance is even now only commencing the process of alteration. Capitalists cared not for machines while the abject division of labour gave abundance of human fingers for their purposes. The stimulus to improvement was lacking. But with the advent of Free-trade, and the increase in the tonnage of ships, food now enters England in abundance, and men freely depart to localities where higher wages prevail, though the equilibrum in food and men is yet far from attainment. But when food shall be as cheap in England as in the United States, and men shall be as dear, the advantages so far from being on the side of the States

will be very largely engrossed by England. Of this, Mr. Wallis's report furnishes the reason.

"The sudden variations in the temperature too, and the extremes of heat in summer and cold in winter, are very trying to the majority of English workmen, and if they are at all given to intemperate habits these are aggravated by the climate, and disease and death cuts them off much more rapidly than is, I fear, generally acknowledged."

There is no doubt of this; the pallid aspect of the "yellow Yorkers" strikes an Englishman at first sight. As compared with American workmen, Englishmen are no doubt more addicted to habits of intoxication; but it is not therefore to be taken for granted that the Americans do not drink, though they are not drunkards. It is, probably, the climate that stimulates the use of, and has generated the names of gin slings, and mint juleps, and sherry cobblers, and cocktails, and has given rise to the huge tee-total associations and the contrivances for evading the oath, such as excluding the sheepwashing days, and keeping an old ram in the cellar with his fleece incessantly wet, a jest indicative of commonly broken vows. This general habit, not of drunkenness but of the prevalent use of stimulants, is an indication of an unfavourable climate, in the same way that our wretched dens, called workmen's dwellings, with an unfavourable climate in the interior, and want of drainage, constantly demand the excessive use of beer and gin.

When the dwellings of working Englishmen shall be on a par with their climate, the working days of a man's life, from the cradle to the grave, will be found more numerous than those of workmen in the United States; and then, England being a healthier workshop, other things being equal, the produce will be greater. The advantage of the American Union is in the abundance of land, on which people squat as agriculturists, by preference, when the wages of labour grow too small for their wants. The land of England is now practically increasing every day, by the facility of transit by ships to America and Australia, and the proximate opening up of half occupied lands in Europe; and Englishmen will not many years longer consent to do the drudgery the American scoffs at. Pleasant as is his native land, he will leave it for longer or shorter periods, to achieve the means of easier living with saved capital. We are but yet commencing ocean transit; we need ships that shall be free from sea-sickness, that shall be homes on the ocean while the transit endures; and if these are not produced fast enough, English agriculturists will yet seek the coasts of the Black Sea with improved machinery to increase their food-growing acreage. Then, with lessened numbers, those who remain at home will give a stimulus to manufacturing machinery that will leave little to America to boast of.

Let not this be understood as undervaluing a great people. They are our brethren, descended from the same fathers, and what they have done we are proud of, and what we have done they claim as their own heir-loom. But let it not be supposed that there is anything in the soil or climate of America giving a power superior to our own. Give us the same freedom they possess, and the result will be greater. Take away from them the annual influx of strong bodied and minded men that emigrate from this land to the Union, and their results will be less.

The people of the American Union never knew what it was to have a glass excise hanging over them like an incubus. Their excises departed when they excised the tea duties in Boston harbour. Yet all they ever did in glass was to produce pretty stamped ware, to hold at tea time the cranberry jam, and dough nuts, and butter nuts, and short cakes, and long cakes, and hung beef, and fifty other etceteras taught to their ancestors by the *hause-mutters* of New Amsterdam and Communipaw. But a scant four years had elapsed from the time when Sir Robert Peel said, "Let glass be free!" and lo we erected a Crystal Palace, and pulled it down, and erected it anew; and in this doing have attained a glimpse of greater marvels yet behind, yet to do, and that will be done. The American people have but as yet imitated afar off our first essay. With a climate needing winter shelter and warmth, even more than our own, and with habits of excessive gregariousness, they have not yet made an artificial climate for the inclement season, and with many wealthy citizens subject to pulmonary attacks. With larger hotels, and larger steamers, they still lack the artificial paradise their people are fitted for; while we still have to educate ours to the enjoyment of dwellings our artists are readier to build than to find dwellers for,—an artificial sky yielding space, and cover, and climate where walls, and roofs, and doors, and windows, would be unneeded. Which nation has gone farthest ahead in the use of glass?

In speaking of the American inventions for wood working, Mr. Whitworth alludes to the "ship block machinery of the late Sir Isambard Brunel," in proof that England has not been behind hand in invention. It is an odd name for an Englishman, and if Sir Isambard be entitled to the merit of the invention, let us at least render honour to his native land, or the land of his ancestors, whether France or Italy. But if he be not the inventor, let us not do injustice to the real man.

In the month of April, of the year 1793, Samuel Bentham, Esq., of Queen's-square-place, Westminster, in the county of Middlesex, England, brother of Jeremy Bentham, the jurist, and subsequently Sir Samuel Bentham, obtained a patent "for his invention of various new and improved methods and means of working wood, metal, and other materials."

Mr. Prosser, of Birmingham, at his own expense, in the service of truth, has rescued the specification from its obscurity, and published it. It is a very remarkable production. Previous to quoting it I will relate an anecdote.

The late "John Farey, Engineer,"—so he was accustomed to sign himself,—one day on his return home, said, "I have been to see Brunel (the elder), who has been ill and confined to his room. When I went in he told me to take a chair. I took up with two hands what seemed an enormously heavy chair, but found it remarkably light. While I examined it he informed me that he had amused his sick time by pasting paper all over the frame of an ordinary stick chair, which, when of a sufficient thickness, he slit through with his penknife and took off, then glueing it together in its form, and adding several more thicknesses of paper till it was strong enough for use."

Precisely this process, by the application of wood shavings, was specified by Samuel Bentham, sixty years back.

"I. *Formation of Laminated Work from Shavings.*—Boards, when reduced to a certain thickness, which is different, according to the nature of the wood, easily break in the direction of the grain: take two or more strata, cement them one on the other (the grain of one crossing that of the other, or of the two others to which it is contiguous), and the strength of the whole, as is well known to workmen in wood, is very much increased. In this way, out of no more than three, or even two shavings, I make a new kind of pasteboards, which are applicable with advantage, to a variety of purposes. That the grain of the wood may receive as little injury in its texture as possible in the operation of making the shaving, the plane I use for the purpose is one in which the iron is much more inclined than ordinary; in some instances, so much so, as to be more like a spoke-shave, or a cucumber slicer, than what is commonly meant by a plane; inasmuch as nothing but the cutting iron is made to pass between the shaving and the wood from whence the shaving is cut. Another precaution taken with the same view, is to wet the wood well, just before the shaving is taken off; this may be done with cold water, but still better with hot water, or steam. (For the method of making a plane capable of taking shavings for this purpose, to any breadth, see the specification of the patent lately granted to me for my new mode of planing). For strength in proportion to weight, the great object to accomplish is, that a disconnecting force, in whatever direction applied,

shall in that direction find the texture of the substance, whether in respect of natural or artificial configuration, such as shall enable it to oppose the greatest degree of resistance. On these principles, not only boards but tubes of wood, and other materials, may be composed of a hitherto unprecedented degree of lightness in proportion to strength, or strength in proportion to lightness, according as the one or the other quality is principally in view. This may be done by winding a single veneer or shaving, spiral-wise, lightly round a mandril; the edge of each succeeding coil fitting exactly close to that of the preceding one, and being made to stick to it, by means of a glue, or any proper cement. A tube composed in this manner, of a single stratum, may serve for some purposes; for other purposes, the stratum, thus formed, may be strengthened by a stratum of paper, or linen, or other cloth, either within side or without. For others, again, the strengthening may be given by a second stratum of thin wood, composed of ribands, of which the grain runs in a direction parallel to that of the axis of the spiral. For others, again, on the first wind another, turning in the opposite direction. Two strata, thus applied to each other, may be cemented together, not only at the edges, but throughout the whole extent of their contiguous surfaces. In this way tubes may be made, either round or oval, or even angular, so long as the angles are not sharp enough to break the texture of the wood, or other substance. A tube thus formed will be more perfect if, while it is on the mandril, but before the cement is set, it has been made to undergo an uniform pressure on the outside, in the manner, for instance, in which metal is pressed into shape by swedges. To make in lengths, a tube for pipes of any length required, make the component lengths taper in such a manner that the smaller end of one shall fit into the larger end of another. To make a bent tube, the ribands, if applied with the same regularity as above supposed, must, it is plain, have their edges not parallel to each other, but sometimes converging, sometimes diverging, in such manner as that the riband shall be broader when it comes to the outer part of the bend, and narrower when it comes to the inner. In this manner tubes, though bent, may be made without any difficulty, so long as the diameter of the tube is either all along the same, or tapering, and the bend such as will admit of the mandrils being drawn out of the tube: where no such degree of regularity takes place, different contrivances may require to be employed. In some cases, where the value of the mandril is not regarded, for instance, if it be of clay, it may be got out piece-meal."

The marginal notes of the specification shew how clearly and widely Mr. Bentham understood the applicability of machinery to purposes of shaping wood and other materials:

"Iron tubes welded. Of thin laminæ. Not weak through the whole thickness. Spirals should over-lap. If in opposite directions. The hole closed. Iron tubes heated in furnaces or cases, for soldering, welding, or brazing. Welding by jumping, or by swedges, and a mandril inside. Cannon of any size may be forged. Before 1792 saw-mills only used for sawing boards. The timber moving on a bed, by a ratchet-wheel. Friction diminished by rollers; or Watt's parallel motion; or wheels placed in fixed parts of machines. Spindle below the bench, and the centres adjusted to produce straight motion. Reciprocate and progressive motion by cylindrical rollers. In cutting stone, one cut at a time, as now in use. Horizontal bar to resist stretching of saw, as in saw for cutting wood. If several cuts made in stone, at once requisite number of saws. Frame receives block to be cut, and is guided by rollers. Wood cut as saw descends. Cut varies as angle of saw. Wood advances during the cut. For sawing veneer uses a wedge. Rollers in wedges. Saws made thicker at the back. Guides to prevent saws twisting. Cross-cutting saw. Sliding beds and stops to cut the same length and angle. To cut a number of pieces alike. Tenons shouldered by saws. Tenons cut by two saws. Sawing curves. Sawing the fellies of wheels. Sawing elliptical curves. Sawing irregular curves by a mould. Sawing ships' ribs. Sawing ships' futtocks, and winding and bevelling surfaces by a mould or director: saw moving perpendicularly. Reciprocate sawing machines worked by power or men. Reciprocate motion to chisels, &c. Reciprocate-lathe. Wood in motion. Tool is stationary. Forming and polishing wood, ivory, metal, stone, &c. Saws thicker at the back. Grinding saws with accuracy: both sides at once. Reciprocating lathe-bed. Bed may vibrate, to produce irregular curves. Bending wood in thicknesses, by heat and moisture, practised in Russia time immemorial in making wheels, &c. Bending for ships, for wheels, sashes, hand-rails, out of the solid wood, not in layers. By division into thicknesses, wood may be curved for carriages, buildings boats, vessels, and ships. Screws formed of wood. Material caution in bending. Ships' ribs bent, to supersede crooked timber. Shell of ship. False and real ribs. Circular saws, boring and grinding tools, already used for boards, ships, blocks, and teeth of cog-wheels. Rotative tool for shaping all sorts of substances new. Circular saw bench. Saw moved by a rigger or cog-wheel. To shape wood or metal by circular saw-bench. Slider to hold rough piece. Two smooth sides. Revelling given by tilting the bench. To cut to any angle. Guide moveable. To cut any number exactly alike. Circular saw to cut taper. Very thin circular saws may be bolted to a flanch. Saws when of large diameter may be annular segments. Saw may be adjusted. Cutting rabbits and tongues. Circular cutters for cutting dovetail groove. Both sides at once. To save power and wood saw may be used. Fluted cutter, called a root-cutter. Cutting mouldings. Cutting-roller. Bench to rise and lower. Curvature, or waving or winding by tilting the bench. Saws and cutter may be of one piece, or the teeth may be distinct Boring to any angle by sliding mandril. New borer. Hollow for passage of chips. Cutting parts separate. Stock thin. Boring annular groove, with twisted bit, or entire tube. Edge of cutter board on outside of tube to discharge shavings. Two or more cutters used in boring water pipes. End of tube may be cut like teeth. Abraded matter extruded by spiral. Extirpation of core by breaking it. Single cutter open tube and projecting elastic stem. Stem made in joints and flexible. Cutter in joints. If core of large diameter, will not drop out. Stock may be hollow, discharged by a spring or rod. Circular configuration by motion of the tool only, for round tenons. Boring from both ends saves half the time. Two borers, each mounted on a mandril, advance together or alternate. Stopping bar. Mortising by boring. Tool sharp at edges and sides. Borer may traverse, or go by steps. Too many leaves clog. Borer may cut out a core. Thin circular saw. Boring employing for inlaying boxes in ivory, stone, and metals. Mortising wood by hand. Squaring end of mortise by a tool having rough and smooth stripes. Mortise-squaring file moves up and down by mechanism, advancing the piece against the tool. Stamping chisel half a hollow square. Stamping mortises by a single stamp, or a pair, or a taper rasping punch, cut into teeth. Impervious mortises. Horizontal cuts by root-squaring chisels. Squaring mortises in wood at a single stroke. Chisel working up and down, the piece advanced a little at a time. Chisel employed for lengthening mortise and mitring such bars, by two chisels at right angles. Lathe with two mandrils pressing against each other, moving simultaneously. Double chuck. Chucking many similar pieces in a lathe, by a sliding bed, called a presenting bed. Turning many pieces of one figure by sliding tool and stop. If tool move along the work, let a tool block slide in a grove to a stop or shoulder. Tool first roughs the work. Piece turns as tool advances. At projections tool stopped, withdrawn, and re-advanced. To finish projections or cavities. Guides to be used when turning long slender articles. Circular cutter, grindstones, or laps. Sides formed by a chisel or by a circular cutter, moving in a slide. Dividing plate for polygons. Lathes may traverse. Screws cut with circular cutter. Spindle inclined to angle of spiral. Two thin cutters for roughing. Taper screws and fuzees cut by circular cutter. Cutting cork. Soft and elastic substances. Rotation combined with motion of knife. Lines traced on bed, but better by stops. Supports ensure expedition and accuracy. Pins sliding in grooves. Screw or wedge. Sliding bed and stop to drop into hole. Boring many pieces alike, as in oblong mortises. Stops at each end. Circular or many-sided pieces to turn on a centre. Nave of wheel mortised for spokes. Stops connected and moved towards each other. Motion of one stop twice that of another. Number of pieces held on a sliding bed against saws, for forming tenons. Closing supports endwise. by two screws, or one double screw and two nuts right and left. Threads of unequal pitch. Wedges to move support backwards as well as forwards. Two racks and pinion. Wedges, levers, or screws, to advance supports equally or unequally, to press pieces of any shape, or raise a bench, or adjust guides. By screws acted upon all at once, for chucking circular or polygonal pieces. Putting together wheels, staves of casks, &c. Universal chuck. Chuck of sliding radial bars, furnished with pin-holes. One pair of supports, each with horns. Rotative motion: advancement best by mechanism: by lever, screw, rack and pinion, weight, or spring. Clogging prevented by blast of air, or solid instrument, as a brush. Rotative motion of clearing tool. Reciprocating motion of clearing tools. Clearing tool, a rack, or cogged bar. My own invention, matured by my

own practice. In some instances may be put in practice by intelligent mechanic, in others engineer may be required. I claim these several inventions. Motion may be given by horses or other beasts of draught."

The elements of all operations in wood shaping may be found in this specification, and certainly of the far-famed block machinery at Portsmouth, the merit of which has been so widely attributed to Mr. Brunel, the elder.

The inventive faculty appears to have been strong in both brothers. In the case of Samuel, it was developed in the form of physical structure. All our modern prisons, from the Penitentiary to that at Islington, take their rise from Bentham's Panopticon. In Jeremy Bentham the inventive faculty took the form of law-making, and the framing of political constitutions. He framed one for Russia, at the request of the Emperor Alexander, who highly approved it, (with certain alterations, leaving the Emperor as universal arbiter,) and thereon forwarded a diamond snuff-box to the legist, who duly returned it, with a request that no such amended constitution might bear his name. Samuel Bentham expended about £30,000 of his own money in promoting progress, and both he and his brother gave up their whole lives to it.

In examining the reports of both Mr. Whitworth and Mr. Wallis, it will be found that the actual condition of American workmen in connection with their employers, and as to means of personal advancement, is precisely that which I laid down as desirable for English workmen in my letter on "Strikes and Lock outs," in No. 61 of this Journal. What, save a better education, is needed to put English workmen in a similar condition—a better education, be it recollected, of masters as well as men.

"As there is no apprenticeship system, properly so called, the more useful the youth engaged in any industrial pursuit become to his employer, the more profitable it is for himself. Bringing a mind prepared by thorough school discipline, and educated up to a far higher standard than those of a much superior social grade in society in the Old World, the American working boy developes rapidly into the skilled artizan, and having once mastered one part of his business, he is never content until he has mastered all. Doing *one* mechanical operation well, and only that one, does not satisfy him or his employer. He is ambitious to do something more than a set task, and, therefore, he must learn all. The second part of his trade he is allowed to learn as a reward for becoming master of the first, and so on to the end, if he may be said ever to arrive at *that*. The restless activity of mind and body—the anxiety to improve his own department of industry—the facts constantly before him of ingenious men who have solved economic and mechanical problems to their own profit and elevation, are all stimulative and encouraging; and it may be said that there is not a working boy of average ability in the New England States, at least, who has not an idea of some mechanical invention or improvement in manufactures, by which, in good time, he hopes to better his position, or rise to fortune and social distinction."

I have practically verified such results in an English factory so conducted. Give to our people generally these conditions with our work-stimulating climate, and

"Nought shall make us rue,
If England to herself do prove but true."

Some six years back, in an article in the *Westminster Review*, entitled "Human Progress," I speculated on the various things yet to be accomplished in machinery, in order to get rid of drudgery and the abhorrent processes of stitching. Even while I wrote, the information was given me that a stitching machine had been produced in the United States; and now the whole world is about to be deluged with them, and a new "Song of the Shirt," celebrating the rescue of the needle woman, might be aptly written, when a hand-made shirt is likely to become as great a curiosity as the pair of hobnailed English ploughman's shoes shown in the Museum of Buffalo.

The stitching machine is but an approximation to what we really want—garments complete from the loom—garments so cheap "that the cast-off clothes of one class shall not be worn by another"—succinct garments, adapted for the working-man or the soldier, or the woman walking out—commodious robes to give the student warmth or coolness—and graceful draperies for drawing-rooms and saloons. The practice of "melting our bodies into clothes" is an unhealthy absurdity, but even that might be accomplished by the loom as well as by the needle. It is surely as easy to make ready-made clothes fit as ready-made boots from France. There is no more difficulty in producing from the loom a Greek Pallium than a Cachemere shawl. There is an absurdity in making a flat web of cloth, with the fibre all dressed in one direction, and then cutting it up, and placing the fibre up and down in all directions. When the fabricator of the material becomes the *tailleur* or *proportioner* of the human figure, such absurdities will disappear. A garment of woollen cloth will then have the nap falling vertically both in sleeves, body, and skirt. The Americans have produced "a seamless bag loom;"—why should not our inventors produce a seamless tunic loom? A larger fortune would be the result than ever was produced by the processes of caoutchouc or gutta percha. There is no more in it than making stockings. Surely that which was performed by hand by the Hebrews of old would not be a difficult task for our modern machinery.

It has been stated, that the wages offered by the Preston masters to their operatives average from 11s. to 15s. per week, and that they have imported Irish people to supply the place of those who refuse to work at their prices.

In Mr. Wallis's report on the Lowell cotton-mills of Massachusetts I find the following statement.—

"The average wages of females [why not call them women and girls, instead of classing them as animals] *clear of board*, [this, of course, means eating three meat meals per diem, drinking, and lodging,] is 2 dollars, or about 9s. 6d. sterling, per week, while the wages of males show an average of 4 dollars, 80 cents, or about 1*l.* 2s. per week. The average hours of labour per day, *exclusive of meals*, is twelve, the mills commencing at 5 a.m., and closing at 7 p.m. Of the quality of the goods produced, it will be sufficient to say that they are, generally, excellent of their class, and quite equal—sometimes superior—to similar goods manufactured in Britain."

Thus it appears that a woman at Lowell mills can actually save 24*l.*, 4s. per annum, less clothing; and a man 54*l.* 4s. per annum, less clothing, and be far better fed and lodged than they can be at Preston. Hear this, ye Preston strikers, and use your subscribed funds to take shipping for Lowell. Do not strive to compete with shoeless Irish immigrants, but rather help them also to escape from the land of white niggerdom, out of the house of bondage.

There must be something wrong in the condition of a trade in England, the whole wages of which are only equivalent to one-half the *savings* of an American workman. The English masters are, probably, trying to economise out of the workman's wages the amount of the American customs' duties on the competing article, and, possibly, the Americans have some advantage in improved machinery.

If the Americans were to abolish these duties, our manufacturers could afford to raise their workmen's wages to something approaching the American standard. In such case they would obtain the trade, and the American workmen would disappear into other employments. Meanwhile our people must give up the American trade, for it is not worth while to continue a trade which degenerates the working-people. We brought this difficulty on ourselves when we enacted the corn laws, putting a duty on American bread stuffs, followed by their increased duties on our manufactures. But eventually this matter will be arranged. If the Americans can earn more money at manufacturing food than clothing, and we can earn more at clothing than food, we shall fall respectively into the

two different employments. But in the specific matter of cotton grown by themselves, it seems certain that negro-slaves or free negros will ultimately work in spinning and weaving mills, to work up in the winter the crop they have raised in the summer. We have imported hill Coolies, from India, to the West India islands, and Chinese into Australia for labouring purposes; and it would not surprise me, if some day, as population grows thinner, our textile manufacturers take to importing negros from Africa. They are fitted to work in a heated atmosphere, such as is required for cloth fabrics, and it would not be difficult to provide them with well warmed model lodging houses for the winter. They would be very cheap *hands*, and after a few years work in England would be the very best people for bringing about the civilization of Africa. This is a question well worthy the attention of such of our manufacturers as can only thrive by low-priced workmen in the present condition of the world. It is a degradation to bring down an English workman to lower wages. It is an improvement to raise the African to the condition of earning wages. We sometimes complain of the laziness of the negroes, and their indisposition to work; but we should recollect that this laziness is usually exhibited in a climate of such intense heat, that white men cannot work therein at all. They do work freely in Canada, and no doubt would find a stimulus to work in a temperate climate in England, with the strong incentive to find the means of purchasing decent clothing and personal ornaments.

This is a question well worthy the attention of cotton manufacturers, the principal difficulty being to ascertain, whether it is better to carry English mills to Africa, or to bring African workmen to England. It would be a remarkable experiment, and worthy a great nation; an example to the people of the Union, a practical "Uncle Tomery."

But whether the cotton trades depart from us, or remain with us, it is clear that we have abundant elements of prosperity without them; and that the unchained progress of America will ultimately be eclipsed by us, till such time as we shall have consumed our raw materials, and failed to devise a substitute.

If the Irish exodus shall extend to England,—and clearing the workhouses to supply Preston, begins to look like it—we may need a considerable infusion of common labourers, and fortunately we have arrived at such a condition of morals, that we could venture on bringing African labourers without the imputation of seeking to convert them to slaves. And their countrymen left behind could grow maize wherewith to feed them. They who have talked so long in Exeter-hall about Negro enlightenment, might do worse things than bringing the negroes here, instead of sending out missionaries. They could watch the proceedings more closely.

I am, Sir, yours faithfully,
W. BRIDGES ADAMS.

1, Adam Street, Adelphi,
March 7, 1854.

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Mr. W. H. Monk, "On Chamber Music."
Geographical. 8½.—1. Extracts of a letter from Capt. Spratt, R.N., "On the West part of the Island of Crete." 2. Mr. H. Parkes, "Report on the Russian Caravan Trade with China." 3. Capt. S. B. Haines, "Variation of the Magnetic Needle, at Aden;" and 4. Mr. J. S. Wilson, "On the proposed North Australian Expedition."

TUES. Royal Inst., 3.—Prof. J. Tyndall, "On Heat."
Syro-Egyptian, 7½.—Mr. S. Sharpe, "On the Ground Plan of the Temple of Jerusalem."
Civil Engineers, 8.—Renewed Discussion on Mr. Yates's paper, "On Decimal Coinage," and Mr. E. Laforest, "Description of Martin's Improved Jacquard Machine."
Medical and Chirurgical, 8½.
Zoological, 9.

WED. Statistical, 3.—Anniversary.
London Inst., 7.—Conversazione.
Society of Arts, 8.—Mr. T. Egan, "On Machines for Dressing Flour, with a Description of a new Machine for that purpose."
Ethnological, 8½.

THURS. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
Antiquaries, 8.
Royal, 8½.

FRI. Architectural Assoc., 8.
Royal Inst., 8½.—Dr. S. H. Ward. "On the Growth of Plants in Closely Glazed Cases."

SAT. London Inst., 2.—Mr. E. W. Brayley, Jun., "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-metallic Elements."
Medical, 8.
Asiatic, 8½.—Prof. Wilson, "On Buddha and Buddhism."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 2nd March, 1854.

Par. No.
73. Committee of Selection—Third Report.
26. Bills—Bribery, &c.
27. Bills—Controverted Elections.
28. Bills—Colonial Clergy Disabilities.
29. Bills—Highways (South Wales.)
Eastern Papers—Part 4.

Delivered on 3rd March, 1854.

57. (1) Trade and Navigation—Accounts.
68. Savings Banks—Return.
75. Malt—Account.
76. District Pauper Schools—Treasury Minute.
9. Bills—Simony Law Amendment.
30. Bills—Church Buildings Acts Continuance.
31. Bills—Common Inclosure.
32. Bills—Vestries.

Delivered on 4th and 6th March, 1854.

66. Exchequer Bills—Return.
53. Constabulary (Ireland)—Lords' Report.
82. Railway and Canal Bills Committee—First Report.
80. East India (Resignation of General Sir C. Napier)—Papers.
34. Bill—Valuation (Ireland) (amended).
Railway Accidents—Return.
Inclosure Commission—Ninth Annual Report.
Arctic Expeditions—Papers.

Delivered on 7th March, 1854.

77. Workhouses (Ireland)—Return.
33. Bill—Payment of Wages (Hosiery).
Loss of the "Annie Jane"—Capt. F. W. Beechey's Report.

SESSION 1852-53.

629. (1) Great London Drainage Bill—Index to Minutes of Evidence (delivered on 4th March).

Delivered on 8th March, 1854.

39. Works and Public Buildings—Abstract Accounts.
74. Brewers, &c.—Account.
86. Immigrants and Liberated Africans—Return.
81. Poor Law—Return.
37. Bill—Education (Scotland).

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, 3rd March*, 1854.]

Dated 3rd January, 1854.

17. J. Bernard, 15, Regent street—Boots and shoes.

Dated 14th February, 1854.

353. T. Bury, W. Glover, J. W. Speed, and J. Hardman, Salford—Finishing woven fabrics.
355. L. Faure, Paris—Iodine.
357. T. Irving, Mould Green, near Huddersfield—Lustry appearance to fabrics.
359. A. Jonson, Mitcham—Barley and grits or groats.
361. P. O'Connor, Wavertree—Lever hinge.

Dated 15th February, 1854.

363. J. Potter, Manchester—Preparing, &c., cotton, &c.
365. B. H. Hine, and A. J. Mundella and W. Onion, Nottingham—Textile and looped fabrics.

367. T. Jennings, Brown street, Cork—Stoppers for bottles.
369. G. F. Wilson, Belmont, Vauxhall—Candles and night lights.

Dated 16th February, 1854.

371. C. F. Varley, 1, Charles street, Somers Town—Electric telegraph signals.
373. J. Greenwood and R. Smith, Bacup—Finishing textile fabrics.
375. J. D. M. Stirling, Larches, Birmingham—Steel.
377. G. F. Wilson, Belmont, Vauxhall—Lubricating matters.

Dated 17th February, 1854.

378. T. Fawcett, jun., Lisburne—Weaving linen, &c.
379. T. T. Macneill, Mount Pleasant, Lowth—Drying flax.
380. A. Ford, 44, Lowndes street—Varnish.
381. H. Ross, Nottingham—Textile fabrics.
382. W. Wright, Wolverhampton—Ornamenting walls, &c.
383. G. Smith, jun., Belfast—Retarding railway carriages.
384. G. Wethered, Maidenhead—Shaking straw.
385. J. Hinchliffe, jun., Dam Side, Halifax—Metallic pistons. (A communication.)
386. R. Holt, Oldham—Bricks and tiles.
387. E. and J. Rowland, Wakefield street, Manchester—Cleaning tubular flues of boilers.
388. M. Poole, Avenue road, Regent's park—Furnaces. (A communication.)

Dated 18th February, 1854.

389. P. G. Harris, Buckingham street, Adelphi—Locomotive engines. (A communication.)
390. W. Morrison, Bowling, Dumbarton—Railway wheels.
391. J. C. Nesbit, 37, Lower Kennington lane—Manure.
392. B. W. Wells, Windmill lane, Camberwell—Floor cloths.
393. E. Loysel, Rue de Grétry, Paris—Infusions or extracts.
394. B. Britten, Anerley—Crushing, &c., ores.

Dated 20th February, 1854.

396. N. Riggenbach, Basle—Incrustation in steam boilers.
398. J. Aspinall, King William street—Sugar manufacture.
400. T. Gray, St. Clement's lane, Strand—Pulp from wood.
402. J. Beall, Cheshunt—Suspending looking glasses.
404. T. Towers, Salford—Billiard and bagatelle tables.

Dated 21st February, 1854.

408. J. Ramsbottom, Longsight—Welding.
410. H. King, 36, Gilbert street, Oxford street—Signalizing between guard and driver.
412. V. Pernollett, 43, Broad street, Golden square—Separating grain, &c.
414. R. Walker, Glasgow—Signalling by electricity.
416. E. Gessner, Aue—Gig mills.
418. J. H. Johnson, 47, Lincoln's inn fields—Matches. (A communication.)
420. A. Dixon, Smethwick—Scaffolding.
422. W. Gossage, Widnes—Alkaline carbonates.

APPLICATION WITH COMPLETE SPECIFICATION FILED.

460. F. W. A. de Fabeck, 18, Norfolk street, Strand—Bridges, viaducts, &c., and other horizontal structures.

WEEKLY LIST OF PATENTS SEALED.

Sealed March 2nd, 1854.

2031. James Pigott Pritchett, of York—Improvements in window sashes and shutters.

Sealed March 3rd, 1854.

2177. Henry Walker, of Gresham street—Improvements in the modes or means of stopping or retarding vehicles used on railways.
2512. Perceval Moses Parsons, of Duke street, Adelphi—Improvements in the switches and crossings of railways.
2671. Robert Griffiths, of 444, Strand—Improvements in propelling vessels.
2961. John Webster, of 3, Cornwall road, Stamford street—Improvements in acting on drying oils and preparing varnishes.
1. Charles Hustings Collette, of 57, Lincoln's inn fields—Improvements in the manufacture of sugar.

Sealed March 6th, 1854.

1299. John Box, of 27, Rue Pepiniere, Brussels—Improvements in supplying water to steam-engine boilers.
2048. Lemuel Wellman Wright, of Chalford—Improvements in reaping and gathering machines.
2051. Henry Wilkinson, Tottenham Mews—Improvements in the construction of air furnaces, parts of which improvements are applicable to other furnaces.
2053. Thomas Pope and Edward Bufton, both of Birmingham—Improvements in buttons, and which improved buttons they propose to desighate by the name of "Buffalo buttons."
2054. Alfred Sommerville and Charles Twigg, both of Birmingham—Improvements in penholders, and which said improvements are applicable to the manufacture of umbrella and parasol sticks, cornice poles, and other such like articles.
2055. Isaac Smith and Alfred Sommerville, both of Birmingham—Improvements in metallic pens and penholders.
2056. Joseph Alsop, of Huddersfield, and Edward Fairburn, of Kirklers Mills, Mirfield—Improvements in baking bread.
2058. David Law and John Inglis, both of Glasgow—Improvements in moulding or shaping metals.
2062. Benjamin Hustwayte, of Hockley street, Homerton, and Richard John Paul Gibson, of Upper Brunswick street, Hackney—Improved composition or compositions applicable to the manufacture of bricks, tiles, and other moulded articles.
2072. Jonas Radford, of Cheltenham—Improvements in clocks or timekeepers.
2116. Henry Dubs, of Vulcan Foundry, near Warrington—Improvements in the method of forging or manufacturing iron and steel.
2306. Henry Dubs, of Vulcan Foundry, near Warrington—Improvements in the manufacture of wheels and tires, and also in the construction of furnaces employed in such or similar manufactures.
2616. Henry Kilshaw, of Birch, near Middleton, and Richard Hacking, of Bury—Improvements in machinery or apparatus for spinning cotton and other fibrous substances.
2624. Henry Kilshaw, of Birch, near Middleton, and Richard Hacking, of Bury—Improvements in machinery or apparatus to be employed in the preparation of cotton and other fibrous substances for spinning.
3041. Adolphus Oppenheimer, of Manchester—Improvements in the manufacture of silk velvet and other such piled goods or fabrics.

Sealed March 8th, 1854.

2068. James Coate, of Marylebone street, Regent street—Improvements in tooth, nail, and hair brushes.
2080. Charles Askew, of Charles street, Hampstead road—Improvements in baths.
2086. Alfred Vincent Newton, of Chancery lane—Improved manufacture of gas burner and gas regulator. (A communication.)
2092. John Grist, of Islington—Improved stave-jointing or shaping machine.
2103. William Weild, of Manchester—Improvements in lathes, and in apparatus connected therewith, for cutting, turning, or boring wood, metal, or other substances.
2104. John Wright Child, of Halifax, and Robert Wilson, of Low Moor Iron Works—Improvements in valves and pistons.
2112. Charles Cannon, of Dance street, Liverpool—Improved machinery for obtaining motive power.
2132. James Higgin, of Manchester—Improvements in burning certain fluids for the purpose of obtaining heat.
2142. Thomas Browning, of Pendleton—Improvements in machinery or apparatus for washing, scouring, or cleansing woven fabrics, either with plain or pile surfaces.
2155. William Carron, of Birmingham—Improvement or improvements in signalling or communicating intelligence.
2182. William Stockil, of Long lane—Improved method of blocking leather used in the manufacture of boots.
2193. Edward Oldfield, of Salford—Certain improvements in machinery for spinning and doubling.
2196. Samuel Alexander Benetfink, of Cheapside—Improved construction of coal ox.
2222. John Henry Johnson, of Lincoln's inn fields—Improvements in machinery or apparatus for cutting paper. (A communication.)
2253. Michael Dwyer, of Woolwich, and James Brown, of Bridge terrace, Mile End—Improvement in anchors.
2436. Pierre Marie Fougue, Louis Réné Hébert, and Vincent Etienne Doret le Marneur, of Paris—A fortune rudder in bronze.
2803. Henry Deacon, of Widnes, and Edmond Leyland, of Saint Helen's—Improvements in apparatus for the manufacture or production of sulphuric acid.
2827. Edward Lavender, of Deptford—Improvements in apparatus for subjecting substances to the action of heat, for the purpose of carbonizing, calcining, or combining such substances, or for subjecting such substances to the process of distillation.
2859. Pierre Marie Fouque, Louis Réné Hébert, and Vincent Etienne Doret le Marneur, all of Paris—Improvements in rudders.
7. Peter Armand le Comte de Fontaine Moreau, of South street, Finsbury—Certain improvements in water wheels. (A communication.)
86. Robert Maclaren, of Glasgow—Improvements in moulding or shaping metals.
110. Robert Maclaren, of Glasgow—Improvements in moulding or shaping metals.
128. Alexander Dalgety, of Florence road, Deptford—Invention of a new construction of rotatory engines or pumps.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854.				
March 2.	3573	Letter Clip and Bill File	John Allday	Birmingham.
„ 4.	3574	Lady's Mantle	Nicoll, Haynes and Symes.	Warwick House, Regent street.

Journal of the Society of Arts.

FRIDAY, MARCH 17, 1854.

NOTICE TO INSTITUTIONS.

As many Institutions have recently joined the Society, the Council deem it right to repeat the offer made by the Representative of the late Colonel Gurwood some time back, to the effect that Institutions in Union might purchase copies of the well-known "Despatches of the Duke of Wellington," published at *eight* guineas, in eight volumes royal octavo, bound in cloth, for *four* guineas. The Council wish particularly to call attention to this favourable opportunity of obtaining on very liberal terms a work which, they presume to say, should be found in every public library. The Secretary will receive orders for the work, which should be accompanied by a post-office order for four guineas, and will arrange for its prompt transmission.

FOURTEENTH ORDINARY MEEEING.

Wednesday, March 15, 1854.

The Fourteenth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 15th instant, C. Wentworth Dilke, Esq., Vice-President, in the chair.

The following candidates were balloted for and duly elected:—

Holland, Richard Leigh. | Kershaw, Joseph Hughes.

The following Institutions have been taken into Union since the last announcement:—

347. Highworth, Literary and Scientific Institution.
348. London, North West London Christian Literary Institute.
349. Pembroke Dock, Mechanics' Institute,
350. Westerham, Literary Institute,
351. Wolsingham, Mechanics' Institution and Literary Society.

Mr. G. G. Delotz exhibited some specimens, displaying much variety of texture and effect, illustrative of an invention for Etching on Steel. He stated that large plates might be so engraved, with the greatest facility, in a few hours.

The Paper read was:—

ON MACHINES FOR DRESSING FLOUR.

BY T. EGAN.

Of late years the attention of philanthropists and statesmen has been more particularly turned to bettering the condition of the humbler classes, especially in obtaining for them cheap bread, as one of—or, indeed, the prime necessary of life. Next to procuring cheap corn, comes the consideration of the best and cheapest means of manufacturing it into wholesome food.

The mode of dressing meal after it is ground into flour, is a subject that, no doubt, has engaged the attention of men in all ages, from the earliest dawn of civilisation, when men first began to settle down from hunting and the chase, and to grow corn and cultivate land for human subsistence; but it must soon have occurred to them, even in a rude state, that the outer skin, or what we term bran, made their cake dark in colour, and was not nutritious, or good for human food, so that they would soon try to devise means for separating this outer and innutritious skin called bran from the fine flour. Most probably, the first invention for this purpose was the skins of sheep, or other animals, perforated with small holes, and fastened to a wooden frame. This frame being shaken, flour would pass through, whilst the bran would remain above. The second step, probably, was the invention of a sort of sieve, made with very thin slits of narrow wood, crossed upon, and worked down into each other, forming a kind of weft and warp, which was attached, as they best knew how, to hoops. To this sieve a semi-rotatory shaking was given, so that the fine part or flour was let through, whilst the bran or larger particles were held in the sieve. This kind of sieve is, to this day, used in many parts of Ireland and Scotland and, indeed, in some parts of England; but growing intelligence, however, has substituted wire sieves, which do the work both quicker and better. But as population increased, and the wants of man became more numerous, this primitive mode of sifting by hand was too slow a process, and could not longer supply the wants, or gratify the tastes of the more enlightened and higher civilised people. Then it was that power was first applied to sifting meal and dressing it into flour, by means either of wind or water: and as soon as power became thus employed, I dare say the reel was introduced, very nearly as we have it at the present day. This reel consisted of a wooden hexagonal frame, some six or eight feet in length and two feet across, with a wooden spindle or shaft through the centre; over and on the frame was drawn a kind of stocking or web material, sewn together in two or more parts, into which the meal was let from a hopper above. The shaft being connected with the mill, motion was communicated to the reel, and the meal was dressed into flour, such as it was.

The next point I come to, is the kind of web or stocking put upon this reel. The most ancient kind was made of fine linen, probably in six pieces sewn together; and it is a curious fact, that in Austria, Prussia, Bavaria, England, America, and France, this ancient reel is the same in form and shape throughout, except that in some parts of France it is five or six times as long, and is driven six times slower.

The material used for the bolting cloth was that which was most easily attainainable in each country. In Germany and England, linen stretched and stitched with six seams was the first kind of cloth; and there is no question or doubt, but in the process of time, and at a very early period, a mixture of linen and woollen cloth, called linsey, was used; but in France, where silk was the natural product of the soil and climate, that was the easiest to be attained, and there they adopted silk for the bolting cloth. And it has been found, by experience, that a silk web cannot be driven at the same rate of speed as the German and English cloths—a fact which should be borne in mind by our millers when they fancy they have discovered wonders in dressing with silk. To prove that it is not the fabric through which you dress, whether cloth, silk, or wire, but the slow motion, to which the superiority of the meal is due, I know a Scotch miller who drove his wire cylinder round at the same speed as his silk, say about 30 or 40 revolutions per minute, and had exactly the same results from the wire cylinder as the silk machine, in quantity and quality. Had some millers known this, how many hundreds it would have saved them.

I come now to another epoch in dressing flour, and here I am to do justice to a highly respectable firm, who have done much for the improvement of bolting cloths—I mean the firm of Messrs. Blackmore, who first in England brought out the bolting cloth without a seam. This cloth is generally six feet long, and dresses three

four, and five sacks per hour; and I am convinced, if properly set up, or encased, to use a millwrights' phrase, no French silk ever produced could dress a better sack of flour. My conviction is, that if Messrs. Blackmore worked on the same warp an 18, 19, or 20 cloth, each 6 feet in length, that is to say, a cloth 18 feet long, and it was properly set up, it would do much more and better work, at one-fourth the cost, than any silk ever used.

Having now disposed of the history of dressing flour up to the period of bolting cloths, I come to the system of dressing flour through an iron wire cloth. This, as you may easily conceive, when first introduced, made a complete revolution in this country. The reel was changed for circular wooden frames, three or four being used to each sheet or width of wire, as it was considered or said to afford support to the wire. Through the centre of this cylinder ran a shaft, to which a series of brushes were attached, driven at the rate of 300 or 400 revolutions per minute, whilst the cylinder was stationary.

This machine stood at an inclination of three or four inches to the foot. The meal was introduced at the upper end or head of the machine, and in passing from one to the other, the flour was pushed through the wire by the revolution of the shaft, whilst the bran was retained in the cylinder till it reached the lower end, where it fell into a hopper. This machine was apt to clog, and it became necessary for the miller to clear the outside of the wire cylinder from time to time with a hand brush. This mode of dressing obviously produced great pressure on the wire, and the brushes forced the finer particles of bran through the wire along with the flour. Considerable breakage of wire took place, but still the wire cylinders maintained the precedence over cloths, as with them from six to eight sacks could be dressed in an hour, in place of three or four by the old system.

Things remained in this way till the Yorkshire machine was brought out. In this machine, the cylinder was constructed on a somewhat similar plan to the foregoing, save that iron was used instead of wood for the ribs supporting the wire. The cylinder, instead of being stationary, had a slow revolving motion given to it. A series of brushes revolved on the outside of the wire, for he purpose of keeping it clean, thus doing away with the necessity for hand brushing. The interior brushes affixed to the shaft were capable of being adjusted by means of a screw, so as to stand at any required distance from the interior surface of the wire, which they were never allowed to come in contact with. The whole of these motions of the cylinder and the outside and inside brushes were obtained from gearing fixed at the head of the machine. These machines have been largely used, and are very efficient, but they are liable to continued breakage of the wire guaze, more particularly at the ribs, which are used to support the wire as in the machine before described. This machine was fixed at the same inclination as the one in which the cylinder was stationary.

The next change was placing the cylinder vertical, and although this, no doubt, answered as well as the other, I am not aware that it was any improvement upon it.

It is clear that the numerous ribs in all these wire dressing machines, formed obstructions to the passage of the flour through the wire-guaze. It occurred to me, that if I could get rid of these ribs, the quantity of flour dressed per hour would be much increased, without in any way adding to the pressure on the wire; and that, at the same time, economy would result, if, as was supposed, the breakage of the wire-guaze was due to the ribs. In my machine, the only ribs used are those necessary to form the junctions between the sheets of wire—the distance between them thus being about 8 or 9 inches, instead of 2½ or 3 inches, as in the old machines. The inside brushes, instead of revolving with their surface parallel to the guaze, and being continuous throughout the length of the cylinder, as in the Yorkshire machine, are divided into separate portions, corresponding with each sheet of wire-guaze, and are set at an angle, so that one end of the brush is nearer to the cylinder than the other. My outside brush, instead of revolving, has a motion given to it similar to hand-brushing. By these means I find that I have got rid of the frequent breakage of the wire, and can dress a larger quantity of flour per hour. Twenty to twenty-five sacks can be dressed per hour, I do not mean to say with the same expenditure of power as before, but the increase in power is by no means proportionate to the increase in the results produced.

After the reading of the paper, Mr. Egan stated, in reply to questions from members, that his patent machines were now in use in various parts of the country, and that they had given satisfaction.

The Secretary announced that at the meeting of Wednesday next, the 22nd inst., a paper by Dr. Buist, of Bombay, "On Some of the Un-eveloped Resources of India," would be read.

EDUCATIONAL APPARATUS EXHIBITION.

The following letter and despatch, in reference to this Exhibition, have been received from the Foreign Office.

Foreign Office, March 15, 1854.

SIR,—With reference to your letter of the 27th of January last, I am directed by the Earl of Clarendon to transmit to you herewith, for the information of the Council of the Society of Arts, a copy of a despatch from her Majesty's chargé d'affaires at Berne, reporting the steps taken by the Swiss Federal Council, relative to the Educational Exhibition to be held in London this year.

I am, sir, your most obedient humble servant,
(Signed) WODEHOUSE.

P. Le Neve Foster, Esq.

Berne, March 8, 1854.

MY LORD,—With reference to your Lordship's despatch, No. 2, of the 11th February, enclosing a copy of a letter to your Lordship from the Society of Arts, and instructing me to solicit the co-operation of the Federal Council for the Educational Exhibition projected by that Society, I have the honour to state that the Federal Council have, at my request, addressed a circular to all the cantonal Governments, making known the wishes of the Society of Arts, and urging them on their attention.

I have, &c.,
(Signed) W. D. CHRISTIE

Lord Clarendon.

OBSERVATIONS ON THE LAWS REGULATING LABOUR IN PRUSSIA.

In the months of September and October last, Mr. Alexander Redgrave, one of the Inspectors of Factories, at the instance of Lord Palmerston, proceeded to Prussia to inquire into the administration of these laws in that country; and his report will be found at length in the Blue Book lately printed by order of Parliament.

It appears from that report that the attention of the Prussian Government was first drawn to the subject in 1828, by a "Report from Lieutenant-General von Horn, that the manufacturing districts could not fully supply their contingents, and that the agricultural districts had in part to make up the deficiency; * * * that manufacturers were in the habit of working large numbers of children in the night, whereby the physical development of persons of those tender years was checked; and that there was reason to fear that in the manufacturing districts the future generation would grow up even weaker and more crippled than the existing one was stated to be."

Inquiries were made, and the result of the investigation showed—"That a large number of children in the earliest stage of their physical development were employed in manufactories in excessive and long-continued labour, fright-

fully disproportionate to their infantine powers. * * * Such employment precludes in general all exercise in the open air, and causes injuries which can be traced to the position in which they work, either sitting, or standing in a stooping posture, or continually moving some one part of the body. They are almost always employed in highly-heated apartments, in which the artficial temperature must often rise to the highest degree that is bearable. The atmosphere of these rooms, besides, is often loaded with particles of the material used in the manufactories, and these positively noxious substances must necessarily be swallowed by the children, to the inevitable injury of their health. This is the case, for example, in pin manufactories and in cotton spinning. In some factories the children are kept in constant employment in the night time. Such an unnatural mode of life is evidently calculated to repress the physical growth, and to sow in the body the seeds of ill-health in their earliest years. It puts a stop in like proportion to their intellectual and moral advancement; for it deprives them of all opportunity, capability, and power of mental development, and of the full advantages of school instruction."

The Prussian Government, however, did not confine itself simply to the military part of the subject, but viewed the question in its larger sense, as affecting the moral and social condition of the people generally.

About the same time, the disclosures of the Factory Commission in England excited considerable attention, both at home and abroad. In 1839, the Prussian law was passed, with full knowledge of the English law of 1833 and the previous investigation. This law restricted juvenile labour, not only in factories as they are defined in this country, but in every description of employment where youthful labourers were congregated for occupation in buildings or premises. The following is an abstract:—

"S. 1. No child shall be employed in any factory, or in any mine, foundry, or smelting works, under nine years of age.

"S. 2. No person under sixteen years of age shall be employed who shall not have attended school regularly for three years, or can prove by a certificate from the School Committee that he can read his mother tongue fluently, and that he has made a beginning in writing.

"The only exception to this regulation is made in favour of those establishments wherein a school is established for the instruction of the young workpeople; the Government determining the proportion of labour and instruction, and judging of the sufficiency of the school.

"S. 3. No person under sixteen years of age may be employed for more than ten hours per day. An extension of daily labour, at the rate of one hour per day for a period not exceeding four weeks is permitted under the sanction of the Local Police, in order to recover time lost by reason of natural accidents or misfortune.

"S. 4. A quarter of an hour in the fore and afternoon, and one hour at noon must be allowed to each person under sixteen years of age, with option of exercise in the open air.

"S. 5. No person under sixteen may be employed before 5 a.m., or after 9 p.m., or on Sundays or feast-days.

"S. 6. No Christian workpeople who have not been admitted to the Holy Communion may be employed during the hours set apart for instruction and catechizing previous to confirmation.

"S. 7. Proprietors of factories, &c., are bound to keep a register, containing the names, age, parentage, of all young persons whom they employ.

"S. 8. Enactment of Penalties.

"S. 9. The preceding regulations are not to alter the general school regulations; but the Government will permit the school attendance of children to be arranged so as to interfere as little as possible with their labour.

"S. 10. The local commissions of health, finance, and police, are to issue such instructions as they deem necessary touching the health and morality of workpeople in factories."

The term "Factory" has a much wider range in Prussia than in England, and includes all buildings and premises wherein young persons are congregated and regularly occupied in some employment, without reference to moving power, to machinery, or to the material used, which they may follow without the necessity of apprenticeship or particular school attendance. The Government has in other regulations declared in what employments apprenticeship is necessary, and there has not been apparently any great difficulty in determining whether an establishment ought or ought not to be placed under restriction. All processes of the manufacture of textile fabrics, dyeing, bleaching, and printing establishments, all factories for the manufacture of metal work, types, needles, pins, leather, buttons, papers, cigars, tapers, chocolate, &c., appear to come within the meaning of the law.

It appears that the greater portion of the textile manufactures of Prussia issue from the homes of the operatives, or from domestic houses containing machines, in many cases owned by a middleman and hired out to operatives. The linens of Silesia and Bielefeld; the cottons of Elberfeld and Barmen; the woollen cloths of Aix-la-Chapelle; the silks, velvets, and ribbons of Crefeld, are, with some exceptions, thus manufactured; and the employment, being purely domestic, has not been restricted by the law, but the general school obligations are applicable to children who may be employed in any of the details of the manufacture in the same manner as the children of ordinary labourers.

It is here, however, that the greatest amount of abuse exists, where control is most required, but where it is impossible to enforce it.

The execution of the law is entrusted to the commissions existing in every locality, regulating matters of health, police, and finance, and composed of respectable inhabitants, possessing professional and general qualifications for the special commission to which they are appointed. Unfortunately, however, the members of these bodies are too much occupied with their own private pursuits to be the best instruments for the purpose.

Although there exist no regulations applicable solely to factories similar to those in our Factory Acts, for the fencing of machinery, and the periodical cleansing of the rooms, yet the spinning and weaving factories were generally found to be clean and well ventilated; some remarkably well kept, and the dangerous parts of the machinery well covered and protected. Much of the machinery has been brought from England; in the flax spinning factories in Silesia, the property of the Government, the frames are of English manufacture.

But, while in these respects the factories generally in Prussia may appear in advance of those of England, it must not be forgotten that those of Prussia are of comparatively modern erection, some aided by the loan of public money and established by the efforts of the Government, built under the inspection of the local authorities, and according to regulations for ensuring stability, ventilation, and sanitary condition; that a large number of our factories have existed for years, and were built under little or no official or public superintendence, when our trade was in its infancy, and when the expenditure of capital upon a large building and expensive machinery was a more hazardous experiment than later years have proved such a speculation may be.

The law of 1839, though framed in one respect to prevent the unrestricted employment of juvenile labourers, is mainly directed to the furtherance of the existing requirements in respect to education, and has been doubtless so regarded by those to whom the administration of the law has been committed; inasmuch as those regulations which apply to school attendance have been enforced, while the regulations in respect to limitation of the labour of young

persons under sixteen years of age to ten hours per day have been almost universally disregarded.

The clergy and school commissions have carefully watched the observance of the law, so that children under nine years of age are seldom employed, that they have been to school previous to employment, that the certificate in testimony of such attendance has been produced, and that the time required for religious instruction previous to confirmation has been allowed.

This law does not abrogate the necessity of a school attendance after nine years, but by Sec. 9, permits the school attendance to be so arranged as not to interfere with the child's labour in the factory: and in fulfilment of the school obligation, as permitted to those employed in factories, &c., the children frequently attend some public school from five to seven in the evening; this is mere compliance with the letter of the law, for how imperfectly must those two hours, after the day's labour of ten hours and a half have been completed, supply the place of the regular and necessary instruction of a school. In many instances where the proprietor of a factory found it absolutely necessary to employ children of nine years of age, he has established a school upon his premises, and at his own cost, for the instruction of the children employed; and herein has been another failure of the law. Attendance at this school is so ordered as to meet the arrangements of the factory. The children spend one or two hours per day in school (in no case more than two hours per day) the time being substracted from their day's work in such manner as to be next to useless; for instance, in a factory where the hours of work are from 5 a.m. to 7 p.m.; one set of children attend school from 8 a.m. to 10 a.m.; the other set from 10 a.m. to 12. Again, in a factory where the hours of work are from 6 a.m. to 8 p.m., all the boys (eighty) attend school for one hour per day, from 11 a.m. to 12 o'clock. When it is remembered that in the above instances these children worked in their factory in one case ten hours and a half, and in the other eleven hours and a half per day, and that in neither instance did they go to school fresh and prepared to receive instruction, but always after some hours, varying from two and a half to four and a half hours, of previous labour in the factory, it will need little reflection to satisfy any one that such regulations can be productive of little good, even under the most effective system of instruction.

It appears, however, notwithstanding the inducements leading parents to prefer employment for their children to a sufficient education, and employers to seek the less expensive labour of youth, the fundamental institution of the country, which requires the establishment in every district of schools sufficient for the population, and that all children shall attend an authorized school, has been well observed. The machinery for enforcing this end is very effective, so that in Madgeburg the proportion of school-bound children (as they are termed, that is from 6 to 14) who did not attend school was only 0.40 per cent.; and even in the district where the school obligations are least observed, namely, of Bromberg, in the province of Posen, the proportion only reached 9.55 per cent., while the average of the whole of Prussia is 4 per cent.

In 1849 the total number of children receiving public instruction was 15.3 of the whole population, whilst in England, in 1851, it was 11.6 per cent., a difference only of 3.7 per cent. It must, however, be remembered, that in Prussia the schools are sanctioned by authority, and the teachers must possess certain qualifications, and the children cannot leave before attaining the age of 12 years, whereas of the children attending school in England and Wales, no amount of attendance or qualification is required; and in the schools under the inspection of the Privy Council, not more than 25 per cent. are above ten years old.

Notwithstanding the law, the daily labour of young persons under sixteen years of age has not been restricted to ten hours between 5 a.m. and 9 p.m. The usual duration of labour for all, except those children who spend one or two hours per day in school, is twelve hours in each of the six days of the week; in some cases it extends to thirteen or fourteen hours per day if trade is suddenly brisk. The Government as early as 1844 felt the imperfect manner in which the law had been carried out, and its failure to advance the education of the factory operatives. They desired to remedy these defects by the issue of instructions to the local authorities, and sought information from the officers in the provinces, and from the local Chambers of Commerce and other recognized corporations. The majority of these bodies concurred in the opinion of the Government, that the existing law was insufficient, and ought to be replaced by one more effective. The principal grounds upon which a new law was determined were—the impossibility of carrying out the regulations of the law of 1839, in respect to children under fourteen years of age, combining the acquirement of knowledge with daily labour; that such children ought not to be under the disadvantage of missing their school obligation, because the necessities of parents compelled them to work in a factory; that if they worked for ten hours per day, and in addition had one hour and a half for meals, and attended school as required by the general school regulations, five hours per day, there would be but a margin of seven hours and a half for rest and recreation; that ten hours' labour is excessive for children under fourteen years of age; that less than three hours per day in school produces no satisfactory results; and that the factory schools contemplated in sec. 2 of the law have no existence, but that, instead, schools have been established in which the system of education can in no degree replace the regular attendance at school, both from the restricted hours of study, and the impossibility of forcing in those hours the proper acquirement of any branch of instruction; and further, that the increasing development of national industry has created a demand for the labour of youth, whom it is the duty of the Government to preserve from those evils which an unrestricted power of employment produced in England. After various delays a law was passed on the 16th May, 1853, which still follows the outline of our legislation upon the same subject.

"S. 1. The employment of children mentioned in s. 1. of the law of March, 1839, is permitted, from the 1st July, 1853, only after the completion of the tenth, from the 1st July, 1855, after the completion of the eleventh, and from the 1st July, 1856, only after the completion of the twelfth year of age.

"Ss. 2. 3. Require the parent or guardian to present to the employer, and the employer to keep a work book for each child employed, containing the name, age, birth, parentage, abode, certificate of school attendance, a copy of the regulation, and space for the authentication by the employer, &c."

"S. 4. No child under fourteen years of age may be employed for more than six hours a day, nor unless such child attend school for three hours a day."

"The Ministers of Trade and of Public Instruction are authorized to delay the execution of this enactment in cases where establishments might suffer from want of hands."

"S. 5. The times for recreation before and after noon, are extended to half instead of quarter of an hour."

"S. 6. The working hours are further limited to between 5.30 a.m. and 8.30 p.m."

"Ss. 7. 8. 9. 10. Provide for certain notices to be given by proprietors to Government, for penalties, &c."

"Ss. 11. 12. Provide for the appointment of inspectors of factories, and their powers, &c. And for placing the administration of this law under the Ministers of Trade and Commerce, of Public Instruction and of the Interior."

It will be observed, that the execution and administration of this law is entrusted to officers specially appointed for the purpose; and schools established by proprietors of factories shall be conducted on a similar system to that of public schools.

This law has not yet been completely carried out, and

in certain districts on the remonstrance of employers and under peculiar circumstances the Government has granted a delay in the execution of the law.

It does not appear that the enforcement of the law will eventually entail much difficulty, while it will undoubtedly tend much to curtail the excessive labour of youth, and to prolong to them the benefit of the public elementary instruction.

The system is in operation at Berlin, Elberfeld, and Barmen. In the two latter places where there is a continued range of factories for four miles, the law is generally in force, with one exception, a cotton spinning establishment, and in that instance a delay had been granted to enable the proprietors better to meet the difficulties which they anticipated. Generally, however, the factories do not find the proper observance of the school regulations impracticable.

The factories at Berlin are little affected by the law, being principally for metal works, porcelain, shawls, carpets, silks, printing, &c., where the operations are mostly performed by persons over the age of sixteen years. Although the searching scope of this law would be distasteful to English notions and habits, Mr. Redgrave conceives that few would object to the application of some restrictions in this country to certain branches of hand labour, which are regulated in Prussia. He visited one of the establishments of Mr. Mezner, a shirtmaker at Berlin, who employs about 500 hands, and has ten workshops for his hands in different parts of the town. Mr. Mezner employs none under eleven years of age, as younger hands are of no use in his business, but he has many hands at work under sixteen years of age, and therefore under the restriction of the law. The girls who have not been confirmed, and are not able to read and write well, attend daily the elementary or other local school, coming to work only after dinner; those who are able to read and write, but have not been confirmed, attend a school provided by Mr. Mezner, twice a week for four hours at a time; those who have been confirmed are free from school obligation, and are not employed for more than ten hours per day; but all must produce a certificate of having been to school for at least three years, without which they may not be employed. The hours of work never exceed from 7 a.m. to 7 p.m.; the youngest children leave work at 6 p.m. The room which he visited was clean, well ventilated, of sufficient size, and the temperature agreeable; the children and girls seemed remarkably healthy, without any appearance of blanched cheeks or flagging spirits. Mr. Mezner objected to the application of the law to his workshops, which he thought oppressive to himself, as circumscribing his means of obtaining the labour he considered necessary, that is, of the young children, because he preferred children who did not know how to sew, whom he could have properly instructed, to elder children who had been imperfectly taught, and who must unlearn what they had acquired; and to the parents, who are deprived of the earnings of their children, which are in many families necessary for the general support. Similar reasons would be given by many of those who prefer the cheapest rate of labour, regardless of the consequences to morality, and the well-being of the persons employed; but the gain to one of the parties concerned is so great as to outweigh the objections and difficulties of the other, and it must be a source of sincere gratification that the Prussian Government has been able to repress those evils which to this day abound in many of the work-rooms in London. Since public attention was called to the subject here, by the publication of the Report of the Children's Employment Commission, it is probable that much of the iniquity therein disclosed has been abated; but Mr. Redgrave hopes that the gratifying contrast exhibited in the employment which he witnessed at Berlin, may at no distant period be less unfavourable to the English work-room, and that the regular hours of work, even during the "height of the season," may never be extended beyond reasonable and moderate limits.

It appears that the p... securities has hitherto be... loyment of capital, but ... application of capital ... latterly increasing. ... p... system of domestic ... th... nes of the workpeopl... been ... approved. Such m... Th... the ho... e production of ... is much ... y power, and in ... fined to th... iority, or, fro... yarn spun b... In the prod... special supe... such as calic... no competition ... cessarily takin... petition exists, ... power loom is ne... loom.

At Elberfeld ther... e is but one ... it contains 90 looms n... loved by st... is regular (twelve hours ... a day), th... and the produce 350 pie... es per we... In a hand loom factory ... of 150 ... frequently not more than 140 p... yarn for merino is largely ... importe... Bradford.

The total number of power l... ooms ... were 5,018, and the number is con... crease. The operative it is consid... ered ... by the change, for the long hours of t... will be found to be shorter than the ... hand loom weaver.

By returns of the number employed ... tories, under the age of fourteen years, ... work is limited to six hours per day, Mr. ... that there is little fear of any injurious ... supply of labour; and that the enforcemen... will not entail any great amount of oppr... employed. Indeed, the number affected ... in comparison with those in this country, ... restrictions of a similar character have ... Methods are constantly being devised by ... cesses heretofore performed by children ar... by improved machinery.

NEW YORK INDUSTRIAL EXHIBI...

MR. GEORGE WALLIS'S SPECIAL REP...

[*Continued from Page* 290.]

"The importance of the Iron manufactures of ... States may be gathered from the fact that, "by ... of 1850, twenty-one States are returned as prod... iron, and only two, Florida and Arkansas, as n... establishments for the manufacture of iron ... whilst in ninteen States wrought iron is made." ... date the capital invested in the manufacture of ... amounted to about £ 4,500,000, of iron castings ... more than that amount, and of wrought iron to £3,... the produce of each kind being 564,755,—322,7... 278,044 tons per annum respectively. Since th... make is believed to have increased considerably. ... nearly all the large cities, iron foundries of greater ... extent are to be found, cast-iron being largely em... in the construction of buildings both of wood and ... and in Philadelphia, as also to some extent in other ... whole elevations of houses, used as retail shops in ... principal streets, are of cast-iron. . . . . . . retail shops of several stories where light is an object, heavy pieces of masonry tend to lessen the size of windows, these cast-iron elevations appear to be peculi... well adapted. The dryness of the atmosphere, howev... presents a great advantage, from there being less tenden... to oxydization than in a more humid climate." Man... pieces of cast-iron, sometimes enamelled in imitation ... marble, and sometimes merely japanned black, are largel... manufactured in various localities; and in the publi...

(a) Presented to the House of Commons by Command of Her Majesty, in pursuance of their address, of Febuary 6, 1854.

reading-room of the Young Men's Mercantile Library Association at Cincinnati, there is a cast-iron newspaper-stand, constructed of a well arranged perforated ornament. "The general character of the cast-iron work of the United States is admirable, alike for the purity ot surface in the material, and the skill shown in the moulding. The iron being in many instances smelted with charcoal, is of a firm quality and closer grain, so to speak, than that used for similar work in England. Hence the castings produced are sharp in detail and even in surface, and require a very small amount of dressing or filing to complete them. The character of the charcoal-made iron is shown in a remarkable degree in the quality of the wrought-iron nails manufactured at Pittsburgh. These are exceedingly tough, bend like wire, and are very different from the brittle articles of a similar class usually produced in England." The small castings produced at the Novelty works, Pittsburg, Pennsylvania, are excellent, and very little filing is required in the fitting together of the various parts. At these works "a cheap, simple, and ingenious lock, chiefly for bedroom doors of hotels, is manufactured. It has two bolts and two key-holes, but there is no connection between them. Thus the lock cannot be opened except from the side on which it is locked." At the Excelsior works a lock is made with a wrought-iron extension spindle, to adapt it to the varied thickness of doors upon which it may have to be fitted. It consists of a perforated plate acting upon angular notches cut into the spindle; the plate being easily screwed at the requisite distance indicated by the thickness of the door upon which the lock has to be fixed. In the manufacture of butt hinges at Messrs. Greenwood's, at Cincinnati, great accuracy is obtained in the finish of the joints, whilst the labour of filing is saved by grinding the joints of the hinges on stones adapted to the purpose, and driven by steam power. Native copper ore is found in large solid masses at Lake Superior; it is "cut with a cold chisel, for convenience of transport, into pieces weighing from 3 to 4 cwt. It is often of great thickness, and it is also found in "pearls" or washings, of very good quality. The copper, when smelted, is cast into bars and ingots, or rolled into sheets, and in these forms is sent to the various seats of manufacture in the United States. Messrs. Hussey, near Pittsburgh, have one furnace constantly employed in reburning the "slagg" of former refinings, from which they obtain 2½ per cent. of copper. In addition to preparing the copper in sheets and bars, copper tubes for steam boilers and cooking dishes, adapted to the stoves so extensively used for domestic purposes, are also manufactured. The latter being tinned inside after the manner of ordinary hollow ware, form durable and useful utensils." The Scovil Manufacturing Company, at Waterbury, Connecticut, manufacture buttons, by machines invented and constructed upon the premises. 'One machine for punching out the blanks for spherical buttons and raising them to the required convexity in one operation, does its work at the rate of 280 buttons per minute; whilst another machine, fitted with six punches, strikes out 1,800 plain blanks in the same space of time. An ingenious machine is also employed for "milling" the edges of the ordinary plain gilt buttons, and does the work of 10 or 12 girls." * * * "A beautiful automaton machine for shanking buttons has been lately introduced by the Benedict and Burnham Manufacturing Company, Waterbury, and is in operation in their wire-drawing establishment, being the invention of a mechanic in their employ. The blanks being cut in thin brass, are put into a curved feed-pipe, and descend by their own gravity to the level of the machine. Each blank is carried by the machine under a punch which stamps out the centre hole. The shank is made below by another portion of the machine, from a continuous wire carried along horizontally. From this, the wire to make the shank is cut off and bent, being pushed up at the instant the blank, with the centre hole stamped in it, comes in a vertical line therewith. Another punch descends with a hole in the centre, to allow of the double wire forming the shank to go into it, and this gives the blank the requisite concavity and forces the brass tightly round the wire, after which another punch, with a wedge-like edge, descends and opens the wire, spreading it within the concavity, and thus the back of the button is completed. The machine does this in the most perfect manner, at the rate of 180 or 200 per minute. All that is required of the attendant is, to feed the tube with blanks, and when one coil of shank-wire is exhausted to supply another. It is impossible to conceive anything more complete in its way than the machine at work at the period of my visit." * * * "But the chief manufacture of this company is that of brass kettles, or pans, of a novel and excellent character and make. Instead of casting them, as is frequently done in England, the article is spun up from a flat plate, by powerful machinery, constructed for the purpose. Nor is this process confined to the smaller sizes, since they range from 1 to 20 or 30 gallons and upwards. There is great equality of strength throughout, with a less weight of metal than usual. The brass, from the rolling and spinning processes, is more consolidated and tougher than when cast, and therefore is not so easily fractured; yet the whole is effected without the process of annealing. The vessel is strengthened with an iron wire worked into the rim in the process of manufacture. A most useful, and even elegant-looking, though plain utensil is thus produced at a moderate price, and is especially well suited by its lightness, capacity, and durability, to the purpose of the emigrant to the Western States or to new countries, for which markets it is chiefly manufactured." At Waterbury the manufacture of ladies' hair-pins is carried on by automatic machinery. "A quantity of wire is coiled upon a drum or cylinder, and turns round upon its axis as suspended from the ceiling of the workshop. The point of the wire being inserted into the machine, and the power applied, the wire is cut off to the requisite length, carried forward, and bent to the proper angle, and then pointed with the necessary blunt points, and finally dropped into a receiver, quite finished all but lacquering or japanning. The pins are thus made at the rate of 180 per minute, and the machine goes on without any intermediate superintendence being required until the whole coil of wire is exhausted." The chief portion of the ornamental brasswork is cast, little or no ornamental stamping being attempted. "It is scarcely possible, however, to conceive better work than the generality of these ornamental brass castings. At Philadelphia, especially, the greatest attention has been paid to this point, and a peculiar advantage is derived here from the fact that the sand obtained in the vicinity of that place is of so fine a character as to require no sifting for use, and the finest castings are easily made, so far at least as material goes. The pattern is simply modelled in wax, and from this a brass pattern is cast direct, no white metal being used. The brass pattern is carefully and thoroughly chased, and from this all future work is produced. Thus, the shrinkage and variation of size between the white metal pattern and the brass casting, often found to exist in castings made from the former, is avoided, and the register of the two sides of a branch, or other portion of a chandelier or gas bracket requiring to be fitted together, is more perfect than it otherwise would be. The brass pattern, too, takes a sharper and more decisive chasing than white metal, and, as the castings are never chased, as from the fineness of the sand they are sufficiently sharp and effective without it, the accuracy of the pattern is of the first importance, and all that is required to be done after the castings leave the foundry is to file off the very small amount of superfluous metal retained in the casting, and fit the parts together. The bodies of chandeliers, whether vases or dishes, are invariably spun up from the flat metal plate, instead of being stamped, as is usually the case in England. This is the old method of producing these portions of lamps and similiar articles, and appears to have been introduced into practice in America by German workmen. It is not confined to small bodies; but is used for the pro-

duction of larger sizes than are usually considered practicable. Very large bodies, however, are generally hammered up. Discs of plate metal, for the purpose of spinning up, are cut by a machine with two wheels, having the sharp edges working against each other, after the manner of a pair of shears. Those circular cutters work with great ease and rapidity, giving great facilities to the workmen, and presenting an elegant method of doing laborious work with the greatest possible ease and certainty. In annealing the spun work, after the first process of raising from the flat plate, it was formerly found that the metal cracked, more particularly in the bottom angle. As the first form from the plane is a simple truncated cone, the second process of spinning, after annealing, gives the requisite curves to the sides. To prevent this cracking during the annealing process, it has been found that the simple bending or squeezing in of the sides of the cone, until the circle becomes a somewhat elongated ellipse, and then placing a quantity within each other, has the desired effect, and cracking rarely if ever takes place." At Philadelphia, great modifications have been made in the character and strength of the acids used in brass dipping, as it was found that from the great variation of temperature, ranging from below zero in the winter to 96° and 98° in the shade in the summer, nitric acid became unmanageable during the hot season, its fumes being given off so rapidly as to injure the health of the workmen. "In lacquering, considerable improvements have also been made. It was found that the lacquers made after the English formula lost colour very quickly, from the extremes of temperature already noted, and that during the months of July and August, when the due point of the barometer is reached in Philadelphia, the red lacquered work always streaked in the direction of the marks of the spinning tool on the broad surface of metal. After a series of experiments, carried through several months, Mr. Cornelius succeeded in making a lacquer, which he states to be quite permanent under any variation of temperature." In regard to gas-pipes, the screw is turned in a lathe to prevent the possibility of splitting the pipe, which is more or less invariably done by the ordinary screw-plate; and "in order to secure the joints completely, a composition of wax, resin, and venetian red is applied to the tap, which is sufficiently hot to melt it; the pipe is then screwed in, and the joint is at once sounder and cleaner than when cemented by the application of white lead, the usual material employed for this purpose in England." In no instance can the chandeliers, gaseliers, or lamps manufactured in the United States be said to come into competition with the better class of productions manufactured in Birmingham; but in low-priced articles it may be calculated that an English chandelier which would cost *4l. 5s.*, could be obtained in America for about *2l. 15s.*

"A love of display, which is certainly one of the characteristics of the people of the United States, affords ample encouragement to those branches of industry in which gold, silver, and precious stones are employed; and, as a matter of course, the imitations of works of this class are equally in demand amongst those whose means will not permit of an indulgence in the more genuine articles." The manufacture of gold and silver plate is more or less carried on in nearly all the larger cities, especially New York, Boston, and Philadelphia. In the last named city, there are some twelve or fourteen establishments engaged in the trade. "The workmanship is usually sound, but it often happens that on close examination a deficiency in that nicety of finish, especially in the chasing, which characterises the best English work, is observable. Still it is rarely found that the equally, or perhaps more objectionable practice of over-chasing, to the destruction of the artistic effect of the details, is committed. The fault is evidently that of timidity of handling; but there is a wisdom in leaving off at the right time, which the elaborate chasings of English works rarely display." Generally, there is less finish in the works under consideration than in those produced in England, whether they are in gold, in silver, or in the less costly German silver, electro-plated wares, and Britannia metal. Messrs. Conrad, Bard, and Son, of Philadelphia, use a machine for the manufacture of spoons and forks which is thus described: * "Two circular dies or rollers are sunk with forms of the articles to be rolled out. These are usually spoons of two sizes, a fork, and the side of a knife-handle. As the intaglio of one die is accurately adjusted to, and agrees with that of the other, one forming the *obverse* and the other the *reverse* of the pattern, both sides of the article are perfected at once, and the rollers accomplish the work of a stamp press in a much more effective and economical manner. The rollers are about 5 inches in diameter, and are of course manufactured of the best steel, and case-hardened. Being set to the thickness of the articles required, and that of the sheet metal from which they are to be made, the perfect passage of the pieces through the rollers is secured by a series of notches sunk in the margin of each figure upon the die, the impression of these being in the superfluous metal surrounding the work when delivered from the machine. This has to be cut off, and is effected by a circular saw, the prongs of the fork being cut in a similar manner. It is an ingenious and useful invention as applied to light articles in silver, taking up a small amount of space in a workshop, and doing a much larger amount of work than a stamp press." The Ames Manufacturing Company, Chicopee, Massachusetts, produce a great variety of articles; electro-plated wares, bronze statues, brass cannon, the blades, hilts, and scabbards of swords, besides turbine wheels, cotton machinery, planing machines and lathes, which, it will be easily imagined, involve a great multiplicity of operations. At the New York Exhibition, "a tea service of California gold, with a *plateau* of silver, is remarkable for the elegance of the smaller pieces, and the general excellence of the workmanship, and amongst the variety of articles exhibited by this house [Messrs. Bell, of New York], are some of elegant and tasteful form and ornamentation. The engraved work, too, is good, and of better design than usual. Two ewers, exhibited by Messrs. Tiffany, are also of good form and excellent in decoration, and a dinner service, also contributed by them, is neat and elegant, being the very reverse of the usual mode."

The glass manufactures of the United States may be considered to be fairly established, and not only are articles of common use being produced, but there is a growing desire to compete with European rivals in the artistic branches of the trade. It should be remembered that the method of manufacturing glass by means of metal moulds, in imitation of cutting, now generally known as "pressed glass," is an American invention. The chief seats of the glass manufacture are, Pittsburg, Pennsylvania; Boston, Massachusetts; and Jersey city, New Jersey. At the former place there are eight establishments, employing 500 hands, engaged in the manufacture of window glass, and eleven employing about 600 hands and eleven furnaces for the manufacture of phials. Missouri sand is used for the finer articles, and Alleghany sandstone, when found free from iron, is used for the commoner purposes after being pounded and burnt. The average price of pressed tumbler glasses is 2s. per dozen. Pressed glass decanters are manufactured very successfully. They are generally first made as tumblers, and then worked up in the neck. "The metal moulds for the manufacture of pressed glass are made upon the premises of each manufacturer, and as the production of a novelty is a point aimed at by each, as an important element of success, the getting up of new designs demands a considerable amount of care and attention." The New England Glass Company, East Cambridge, Boston, Massachusetts, manu-

* A similar machine to this is said to be in operation in Paris.

facture their own minium, the material in pig lead being brought from the State of Missouri, in which lead has been of late years worked to a considerable extent. The silex used is a sand of beautiful quality, the produce of Berkshire county, Massachusetts. "The glass when manufactured is very clear and pure in colour, the pressed work being remarkably smooth, even, and free from *stria*. The designs and forms are generally well adapted to the material and mode of production. Amongst the large examples, a centre-piece of a tazza-form, with the patera or dish from 2 feet to 2 feet 6 inches in diameter, and the stem and base in proportion, afforded abundant evidence of the extent to which this branch of the business has been carried, and the facility with which large articles are now produced by the pressed method. The cut glass showed care and skill; the bottles are generally of excellent form and make, clean in the neck, and not over-ornamented with cutting. A satisfactory result too is obtained in some articles by the combination of cutting and pressing. The smaller details are pressed, and the larger and broader parts cut. The opal glass manufactured at this establishment is better than the great portion of that produced in Europe. It is clear in body and pure in colour. Bone is used instead of arsenic for the finer qualities. For common articles the latter material is employed as usual." At the New York Exhibition this company exhibited a complete service, pressed, in a neat diamond pattern, and another of cut glass, of very elegant character, and beautiful in workmanship.

The manufacture of porcelain is quite in its infancy in the States, but as materials are to be found in abundance, it is believed that its progress will be rapid. An oxyde of cobalt is manufactured at Philadelphia, and exported to Europe, the ore being found in large quantities near both the Missouri and Mississippi rivers. The fine clay of the State of Missouri is also obtainable in great abundance, and that, with the porcelain clays of the State of Delaware, is said to have been already exported, in small quantities at least, to England. The following passage deserves attention." "The proprietor of the Queen's Ware Pottery Works, at Birmingham, Pittsburgh, is an Englishman, named Bennett, and it is a subject of some regret to report that he was the only person throughout the whole of this inquiry who refused to myself the information asked for. Personal and merely private questions were always carefully avoided, as calculated to prove embarrassing to those who, in a spirit of candour and liberality, were willing to furnish all needful information on public grounds only. Mr. Bennett, however, declined to give any information as to the progress and present position of the trade in which he has been successfully engaged for some years past. It is a source of infinite satisfaction that a course at once so puerile and so obnoxious to common sense, was taken by a foreigner rather than by a native of the United States, and that an intelligent American gentleman, deeply interested in the porcelain trade, did all in his power to compensate for the absurd course pursued by Mr. Bennett, who, in endeavouring to keep secret the resources and power of a country to whose hospitality and encouragement he owes his present position, simply excited a greater amount of curiosity and inquiry.". The manufacture of the common kind of earthenware is established and carried on at Liverpool, at some distance from Pittsburgh, on the Ohio river. As fuel is cheap and materials of various kinds abundant in these two places, Pittsburg and Liverpool, it is more than probable that they will become the great seats of the porcelain and earthenware manufacture. At Bennington, in the State of Vermont, a ware is manufactured known as "Fenton's patent flint enamelled ware." It is produced from a very white clay found near Charleston, South Carolina, takes a beautiful glaze, and presents a remarkably clear and transparent appearance. It is chiefly used in the manufacture of the mottled-brown ware, but presents a white fracture, as the mottled surface is simply in the glaze. Bleaching rings used by bleacher, dyers, and calico printers, for running pieces of cloth through from one part of the dye or bleach-house to another are also manufactured of this porcelain clay, and finished with the brown glaze. They are preferable to the glass rings usually employed, as they are less expensive, and are not so liable to break under the expansion and contraction of the iron stays in which they are fixed for use. A Parian ware of good colour and surface, composed of the flint, quartz, felspar, and clay obtained from the Green Mountain district and the adjacent rivers, is manufactured at this place. It is unglazed and will not stand the test of hot water. "One branch of the ceramic manufacture, as connected with door furniture, is peculiar to the United States, and this is, the very extensive use of earthenware knobs for the fittings of common locks. These are usually made of a striated mixture of yellow and red clay, and finished with a strong brown glaze. Arrangements are made in the moulding for the insertion of the spindle, and they are exceedingly useful and serviceable articles."

The manufacture of furniture is carried on to a great extent in nearly all the large cities and towns of the United States, the constructive portions being prepared by machinery. This department of industry was largely represented in the New York Exhibition. The American woods are not so much used as might be expected, walnut and oak being those which are generally selected. Elaborate carving in wood is the rule rather than the exception, and in papier maché, the productions are all below mediocrity, being chiefly imitations of the worst style of pearl inlaying and japan work executed in England. Paper hangings are manufactured to a large extent, and are printed both by block and by cylinder.

"The law for the protection of copyright in designs forms part of the patent laws of the United States, and the office for granting copyrights, or rather patents, forms a department of the Patent Office at Washington, with a special officer to attend to applications of this class. The protection is granted for configuration and arrangement of the ornaments. None but citizens of the United States are entitled to the privileges, which are granted after due examination as to originality, &c., for seven years: or half the time granted in a patent for invention, &c. The fee paid is one-half the patent fee, or about £4. * * * The forms are precisely the same as for obtaining a patent for an invention, &c. * * * * With regard to the kind of articles, the designs of which are usually patented, stoves and metal castings are by far the greatest number. In textile fabrics, very few are protected. Indeed, with the exception of the first-named articles, it is difficult to suppose that much originality in design could be legally claimed. In 1852 there were 126 applications for patents for designs, and of these 106 were granted and 20 were rejected.".

The question of art-education, as applied to manufactures is beginning to claim serious attention in the United States; but, "so far as institutions for the special purpose of teaching art in its application to industry have been at present carried, they are intended, with the exception of that attached to the Maryland Institution, Baltimore, for the instruction of females only. The first School of Design was established about four years ago, at Philadelphia, chiefly through the efforts of Mrs. Peter, the lady of the late British Consul to the State of Pennsylvania," and its success appears to have suggested the foundation of similar institutions at New York and Boston. At first this school was partly supported by the contributions of Mrs. Peter and her friends, and partly by the fees of the students. Subsequently the committee of the Franklin Institute undertook the management of the school, but that connection is dissolved, and now it is proposed to raise an endowment fund of about £11,000, and to provide for carrying on the school by charter. The school formerly numbered seventy-four students, but in June last there were only twenty-three on the books, as it is a rule for nearly all the scholastic institutions of the United States

to take their long vacation during the hot months of the year. There is a rival establishment, conducted by a former male teacher, which is known as the "Institution for the instruction of Young Ladies in Design," as contradistinguished from the "Philadelphia School of Design for Women," and which numbers 32 students. The fees to the latter school are not quite 10s. per quarter for those whose situation in life will not allow them to pay more, and about £1 for those who can afford to pay that sum. Ladies whose means are ample pay £2 5s. to £5 5s. per quarter, according to what they learn. "In connection with the Franklin Institute, Philadelphia, is a drawing class for mechanical and architectural drawing, in which from 60 to 70 students receive instruction during the winter, on three evenings per week for 24 weeks, commencing on the first Tuesday in October in each year. The fee is about £2 5s. for the session. No free hand-drawing is taught." "'The New England School of Design for Women' was opened in October, 1851, under the superintendence of an Englishman, a former student of the Birmingham School of Design. The rooms were adapted to the accommodation of 70 students, and this appears to have been the average number in attendance during the greater part of the time the school has been established. The objects of the school, as stated in the prospectus, are:—1. To educate a body of professed designers, capable of finishing original designs for manufactures, and other purposes where ornamental designs are required.—2. To teach the various processes of engraving, lithography, and other methods of transferring and multiplying designs.—3. To educate a class of teachers in drawing and designs. As the school is intended for a standard or normal school, students are not admitted under fifteen years of age. The fees are about £1 3s. per quarter. The class hours are from 9 a.m. to 2 p.m. every week day except Saturday, and the school is open during all working hours for students in special departments, and for the industrial classes. The programme of instruction, without being very precise, is based upon the general terms of those of the English schools. . . . . Lectures are delivered on botany, and a female teacher is specially engaged in giving instruction in this science to all the pupils." Subscribers of 20 dollars have the privilege of nominating one student *free*, but as the expenses have hitherto exceeded the annual income, the House of Representatives of the State of Massachusetts has recently sanctioned a grant of about £350 per annum, for three years, in support of the school, as an experiment, thus giving it the advantage of State sanction and raising its income to the amount which its present wants demand. "The general character of the instruction given, both in the school at Philadelphia and Boston, has relation more to pattern-making for manufactures, and teaching drawing as an amusement or accomplishment, than inculcating and enforcing the steady pursuit of the arts of design in their highest forms, whether as applied to manufactures or otherwise." The radical defect of both schools, is the want of a really useful and practical series of ornamental casts, and a severe course of elementary outline examples. "The School of Design, forming part of the 'Maryland Institute for the promotion of the Mechanic Arts,' at Baltimore approaches much nearer in its character to the standard and objects of such schools in Europe, and is under the management of an Englishman, Mr. Minifie. The school was opened in 1851, and then consisted of three departments—the Primary, in which elementary free-hand drawing, &c., was taught; the Architectural, in which the principles in construction and the styles of various periods were studied; and an Engineering Class, in which the drawing of machinery, mathematics, and the general principles and rules of calculation, as applied to mechanical engineering, formed the subjects of instruction. This plan appears to have been changed since Mr. Minifie undertook the direction, and the school now forms one department divided into six classes:—1st. An Elementary Class; 2nd. A Geometrical Class; 3rd. A Mechanical Class; 4th. An Architectural Class; 5th. An Engineering Class; and 6th. An Artistic Class; the titles of which will sufficiently indicate the studies pursued in each." The school is now attended by about 400 students divided into the six classes, each meeting one evening per week. "The study of drawing in the public schools of the various States is exceptional, and no settled system exists. In the Girard College at Philadelphia, drawing is taught from models of geometrical solids; but the early progress of the students is retarded by the fact, that not being first taught to draw lines and simple forms projected upon a plane surface, and to be copied as an exercise for the hand and the eye in the apprehension of real form, they work in great uncertainty, and only attain proficiency, even in the delineation of lines, after a lengthened period."

In conclusion it is stated that both textile and furnishing fabrics are made more for appearance, and less for actual wear and use than in England. The Americans do not wish the former to last more than a single season, or the latter longer than two or three years, and they will not pay ever so slight an advance for a better quality provided the cheaper article looks as well as the dearer. In the department of ornamental manufactures, there is no appearance of any attempt to strike out a national style, "and the adoption of European designs for totally different purposes to those for which they were originally intended, are amongst the least of the errors committed in a vague seeking after novelty." "The compulsory educational clauses adopted in the laws of most of the States, and especially those of New England, by which some three months of every year must be spent at school by the young factory operative under 14 or 15 years of age, secures every child from the cupidity of the parent, or the neglect of the manufacturer; since to profit by the child's labour during *three-fourths* of the year, he or she must be regularly in attendance in some public or private school conducted by some authorised teacher during the other fourth. This lays the foundation for that wide-spread intelligence which prevails amongst the factory operatives of the United States, and though at first sight the manufacturer may appear to be restricted in the free use of the labour offered to him, the system re-acts to the permanent advantage of both employer and employed. The skill of hand which comes of experience is, notwithstanding present defects, rapidly following the perceptive power so keenly awakened by early intellectual training. Quickly learning from the skilful European artizans thrown amongst them by emigration, or imported as instructors, with minds, as already stated, prepared by sound practical education, the Americans have laid the foundation of a wide-spread system of manufacturing operations, the influence of which cannot be calculated upon, and are daily improving upon the lessons obtained from their older and more experienced compeers of Europe. Commercially, advantages of no ordinary kind are presented to the manufacturing States of the American Union. The immense development of its resources in the West, the demands of a population increasing daily by emigration from Europe, as also by the results of a healthy natural process of inter-emigration, which tends to spread over an enlarged surface the population of the Atlantic States the facilities of communication by lakes, rivers, and railways; and the cultivation of European tastes, and consequently of European wants; all tend to the encouragement of those arts and manufactures which it is the interest of the citizens of the older States to cultivate, and in which they have so far succeeded that their markets may be said to be secured to them as much as manufacturers, as they have hitherto been, and will doubtless continue to be, as merchants."

Monster Steam Ship.—The ways for an immense screw and paddle-wheel steamer have just been commenced at Messrs. Scott Russell's. The principle of her construction will be similar to that of the Britannia tubular bridge.

NAVIGATION AND SHIPPING.

Board of Trade Return for 1853.

The shipping returns of the Board of Trade for the past year have just been published, and their general results are exhibited in the following table. Both as regards entries and clearances, they show a large increase in the employment of British tonnage, and a still larger increase in foreign. Except, however, in the salutary reflections they suggest as to the position in which the trade of England would have been placed during the last 12 months if the repeal of the navigation laws had not been carried, so as to give it the aid of foreign vessels, the interest of these returns has long been diminished by the fact that they afford no indication as to the extent to which British shipping would, under ordinary circumstances, gain in the struggle of competition. The activity of the demand for freight has caused every available British vessel to be employed, and, whatever might be the relative merits of British or foreign, the surplus demand could only be met by the latter. For the future the rapid construction of new ships, to which this state of affairs has led, would be likely to afford more play for testing the point in question; but the occurrence of war, by leading to the employment of neutral vessels, will now constitute afresh element to be taken into account.—

Tonnage entered inward:—

	1852.	1853.
British vessels	4,267,815	..4,513,207
United States' vessels	863,660	.. 901,575
Other countries ..	1,598,694	..2,382,768
	6,730,169	7,797,550

The clearances outward were:—

	1852.	1853.
British vessels	4,459,321	..4,551,498
United States' vessels	821,844	.. 962,337
Other countries.. ..	1,591,416	..2,069,776
	6,872,581	7,583,611

With respect to the coasting trade, the tonnage entered inward was 12,394,902 in the year 1851, 12,475,401 in 1852, and 12,820,745 in 1853. The clearances outward were 13,466,115 in 1851, 13,441,815 in 1852, 13,49 3,804 in 1853.

ON REFORMATORY AND INDUSTRIAL SCHOOLS FOR VAGRANT CHILDREN.

By J. C. Buckmaster.

An opinion is gaining ground that the education of the present day is not sufficiently practical, and the question is asked of what use is education to the working classes unless it can be usefully carried into the business of every-day life? The circumstances of a boy's early life will in some measure determine his future character. His education should always have reference to the fact,—that he is to live by his labour. Subjects connected with our national industry ought to form part of his instruction. The elements of political economy should be taught, and the laws by which the price of labour is determined might be beneficially introduced. Thoughtful habits of frugality and industry should be earnestly inculcated, and the character in some degree prepared for those trials and vicissitudes to which the working population is liable. With a character so formed he would feel that he was sent into the world to work, and that a life of labour is an essential part of his existence. The physical exertion he was called upon to endure would be subservient to a higher force. The mind would direct the operation of the hands, and the brute force of the animal would be softened by a knowledge of the laws by which labour is influenced. A life of early indolence is worse than ignorance. Many of the boys at Parkhurst date their ruin to a life of idle vagrancy in the streets. In all our village schools, especially in agricultural districts, a piece of land should be connected with the school, and wherever it is possible, labour of some kind should form part of the education of every working man's child. Whatever is likely to contribute to their future usefulness, they should be taught to know and understand when at school. A boy working one or two hours a day upon the land, under proper superintendence, will acquire much useful information. The men best suited to impart this education are those who have belonged to the class they have to educate. In towns there would always be a great difficulty in associating labour with the ordinary routine of a school. Familiar lessons of an industrial character might be given, some of the principal tools used in trade might be shown and explained, and some of them could be employed to illustrate the lesson. In agricultural districts education could be made of a more practical character. Go into any of our schools in agricultural villages. how seldom do you hear anything about the application of scientific principles to agriculture, the rotation of crops, the management of bees, the nature of manures, the growth of plants, the relative nutritious value of substances used as food; why bread is sometimes dear and sometimes cheap; why the price of labour does not fluctuate in the same degree. Yet I imagine that knowledge of this kind is of the greatest importance, because it is a kind of knowledge which the labourer can carry into the practical concerns of life, and afford sources of happiness and contentment to the man who is fortunate enough to possess it.

If these remarks apply with any force to the children of the working classes, they apply with double force to our vagrant juvenile population. Ragged schools, as they are at present constituted, can never effectually conquer the evil which has called them into existence. If the reformatory principle of these schools is to produce any permanent result, it can only do so by such a kind of training as shall fit the boys for that station in which they are afterwards expected to live. Boys accustomed for years to the vagrancy of a street life, are not to be reformed by assembling together for a few hours in a dirty, badly-ventilated room. An impure atmosphere engenders a low state of morals, it familiarizes boys with dirty habits, and induces impurity of mind. The irregular attendance of boys at a Ragged School is a great drawback on their efficiency; to-day they are at school, and to-morrow they are in the streets. The great object is a permanent change of character, and this cannot be effected by a casual attendance at school. It can only be accomplished by continually surrounding the boys with good influences from without, and the awakening of good impulses from within. We must endeavour to quicken in their own breasts a desire to be better, and education will contribute to this as far as it enables them to acquire virtuous and industrial habits. Boys hardened in heart and depraved in character, must be under continued superintendence, until kindness and hard work have subdued their passions and softened their hearts. If a boy in a ragged school exhibits satisfactory symptoms of amendment, what means are there for encouraging and strengthening this change of character? for what situation in life has his attendance at school adapted him? what industrial habits have been formed? what security have we against a relapse into former habits? Cleaning shoes and sweeping crossings is not a suitable occupation for these boys. We must not expose children to the temptations of a street life, before we have some security that they are proof against its influence. Habits of morality and industry are seldom formed by occasional labour in the street. It is customary in some schools to teach tailoring and shoemaking. All the junior boys at Parkhurst are taught tailoring, and I believe it forms part of the industrial work of most pauper schools. I know of no trades worse suited for these boys. There is also a strong prejudice against this class of boys learning trades, and it is not desirable to strengthen this prejudice by bringing their

labour into competition with that of the poor artizan. Agricultural labour is free from this prejudice; it can be cheaply taught, and learned without much difficulty. The labour of an industrial school should be of a productive character. No boy should waste his time in unproductive labour, nor should any boy be made to work as a punishment. The various pursuits of agricultural life, such as weeding, hoeing, haymaking, ditching, &c., are those best suited for the success of a reformatory school. To teach boys to live by their own industry is as valuable as teaching them to read. Labour has ever been the great humanizer of man; it softens the character, subdues the passions, and purifies the conceptions of the mind. All attempts at reformatory schools, without plenty of work, are likely to prove a failure. Ragged Schools have no means for making labour a prominent feature in the training of boys. This difficulty in large towns will always impair the efficiency of reformatory schools.

(*To be continued.*)

Home Correspondence.

WOMEN AND GIRLS *versus* FEMALES.

Sir,—I was not a little amused at finding that Mr. Bridges Adams, in quoting my Report on the Cotton Manufactories of the United States, objects to the term "females," as applied to the "young lady" factory workers of Lowell. As they are usually known in America as the "Lowell young ladies," I fear that Mr. Adams' translation of the generic term "female" will create a great flutter of blue veils, and an indignant flourish of parasols amongst them, should they chance to see his communication in your last journal.

Fortunately for myself, in all returns published at Lowell, this (to Mr. A.) obnoxious word is used, and therefore I cannot think that I am so far wrong in using it.

By the term "women" the "young ladies" generally understand married females,—I beg pardon, ladies. By the term "girls" they understand females (there you are again!) under 15 or 16 years of age. Now, it happens that neither married women nor very young girls are employed to any great extent in the factories of the States, and, therefore, according to American notions at least, "women and girls" would not be the correct term to use, since "when at Rome people must do as Rome does." It appears, however, that it is desirable to insert an erratum for the use of Mr. Bridges Adams and others who are especially particular, and he and they will please, in future, for "females" to read "young ladies," as "women and girls" is not according to the Massachusetts standard of propriety.

I am, your's respectfully,
GEORGE WALLIS.

NEW METAL.—ALUMINIUM FROM CLAY.

Sir,—The result of the experiments lately made in France by M. Deville, to obtain a metal from argillaceous earth, has been highly successful. It is true that M. Wöhler discovered the metal *aluminium* in his researches in 1828 and 1846, but the metal he describes did not melt except at a very high temperature. The pure metal now introduced to the world by M. Deville, is stated to be as white as silver, malleable, and ductile. In tenacity it approaches iron. The melting point differs little from silver; in density it is only 2.56, or about that of glass and flint; it does not sensibly oxidize when melted and cooled in the air; it is a good conductor of heat; it is unalterable in dry or humid air; it is insensible to the action of sulphuretted hydrogen, or to hot or cold water, or weak or concentrated nitric acid, or weak sulphuric acid. Muriatic acid appears to be its true solvent.

M. Deville has announced that he is making further experiments, in order that the metal may be obtained in sufficient quantity to be available in the arts and manufactures.

The discovery of an easy mode of procuring this *noble* metal from clay, which is so abundant in the world, would open the way to fame and fortune for the discoverer. The following simple experiment has been made by M. Chapelle, who, as soon as he heard of M. Deville's discovery of the pure metal aluminium, made the following trial:—He introduced pulverized clay, with marine salt and powdered charcoal, into a common crucible, and heated it in a reverberatory furnace by means of coke, but he did not succeed in obtaining a white heat. After cooling, the crucible was broken, and in the mass a considerable quantity of small globules (about half a millimetre in diameter, or about 1-50th of an inch,) were found, of the colour of silver. He did not ascertain if these globules were quite pure; he, however, states that they were insoluble in cold nitric acid, but were soluble in muriatic acid heated to 60°.

Even so far back as 1819, Mr. Brande stated in his lectures at the Royal Institution, that the earth alumina is analogically considered as a *metallic oxide*. I feel sanguine that M. Chapelle's experiment may be repeated with better success on a large scale, and by additional portions of salt and charcoal being intimately mixed with the powdered clay. Both soda and chlorine have considerable action on alumina and its metallic base. Why should not carbonic acid be formed by the burning carbon absorbing the oxygen from the alumina during its transition state, thereby leaving the metal at liberty. I hope those who have the means at their disposal will not fail to try the reduction of the metal from clay in large furnaces. I cannot doubt the ultimate success. That success would open a vast field to the industrial energies of the country, and far exceed in real utility the golden treasures of California and Australia. The useful application of such a metal I need not point out to your readers. In fact, the metal is superior to silver on account of the unchangeable character of its influence. Why may we not hereafter have *aluminized iron* for our roofs and general new work, instead of the galvanized iron.

I remain, sir, your obedient servant,
CHARLES M. WILLICH.

25, Suffolk-street, 13th March, 1854.

FLAX, AND ITS PRODUCTS, IN IRELAND.

Contributed by Wm. Charley, Seymour Hill, Belfast.

LETTER VII.*

In the autumn of 1822, the Linen Board despatched their most intelligent inspector (Mr. Besnard) on a tour through the flax growing countries—Holland, Flanders, and France. This was a very judicious step; and the report furnished to them on the return of this gentleman contains a large amount of useful information. He stated that the *market* regulations in Holland were excellent, and that, consequently, the trade in flax carried on in those markets was conducted in a straightforward manner, few cases of fraud being complained of.† The style of bleaching in Holland was at that time very simple and old-fashioned, all being done by *hand*. I believe at the present day some of these establishments are in existence, though, of course, not likely to remain much longer without some machinery. The exceedingly flat surface of the country deprives the people of the advantage of water as a driving

* I omitted mentioning in Letter VI. that the grant of money there stated, as received from Parliament by the Linen Board, was £21,600, of the old Irish Currency. This would be scarcely equal to £20,000 of British money; but the Board derived a revenue from some appropriated duties, which raised the amount of their income to something over £20,000 *present* currency.

† One of the rules prohibits smoking, a piece of self-denial rarely expected on the Continent, and, I should think, a rule very difficult to enforce.

power, and, consequently, the steam-engine is just the thing to suit; the latter is being introduced, I understand, of late years, and when provided with such a regular and motive power, I have no doubt the Dutch and Flemish will make considerable progress in the application of machinery for spinning and bleaching purposes. Mr. Benard describes a peculiar soap made from the oil of the *Œillet Plant*, a species of poppy. This was sown in April, and pulled in July and August; the seed was shaken out in the field, and from it a very nice oil was expressed, the best part of which was used for salads, and the second quality for mixing with paints, being superior to linseed oil, as it dried more quickly, and did not discolour the most delicate shades. This second quality was what was used for making the *Œillet soap*; the bleacher was stated it gave a clearness and softness to the fibre quite distinct from the effect of common soap.

The Dutch Boers always saved the seed of the flax, and valued it as high as £8 or £9 per acre; they informed Mr. Besnard that this was done without any injury whatsoever to the quality of the fibre. This is a point in flax cultivation which has of late years been the subject of much discussion in Ireland, but its consideration will not be introduced in this letter. Both in the Netherlands and France the agriculturists were very particular in the steeping of their flax; only one layer was put at once into the lint holes, and the *air and light* were most carefully excluded. This caused much more evenness in the colour of the fibre than was usually obtained in the flax of Ireland, where this precaution has never been perhaps sufficiently attended to. The quantities of flax and linseed in Holland, at this time (1822-3) were computed to be 12,000 tons of the former, and about 10,000 hogsheads of the latter. Passing from this subject to transactions at home, I find, in 1823, a memorial was sent by a large number of respectable farmers to the trustees of the linen manufacture, protesting against the appointment of more inspectors for the flax markets, on the grounds that "the charges made of fraud were false and calumnious, having their origin in the imagination of some greedy and designing expectants." They objected also to the Dutch plan of selling by small samples, on account of the immense variety of qualities and the limited amount of each parcel.

This document was got up in the County of Donegal, and speaks well for the manly spirit of the farmers in that locality. In this year (1823) Mr. James Murray, Surgeon, Belfast (now, I believe, the well-known Sir James Murray) invented a test fluid for detecting any deleterious substances used in plaistering linen cloth. The article most used for this purpose was some peculiar preparation of carbonate of lead, which gave the linen a false appearance of strength and quality, and, in some measure, interfered injuriously with the bleaching process. A great commotion was excited also this year by the introduction and subsequent detection of the system of making "unions" with cotton warp and linen weft.

Many meetings were held to denounce this novel manufacture, and the Government were strongly urged to insist on such articles being sealed unions, to distinguish them from pure linens—in fact, asking for an enactment not unlike the present law regarding coffee and chicory, which prohibits the mixture being sold without a proper label describing the combination or union. All respectable manufacturers would, of course, mark their goods as cotton and linen unions; but, even at the present day, some of the small traders are not very particular in this respect, and frequently goods half cotton are passed off as all linen, to the detriment of the genuine producer, and to the injury of the fair fame and reputation of "*L'etoile d'Irelande.*"

Among other applicants to the Linen Board for a loom, I find the name of John Phillips, of the now notorious Six-Mile Bridge, County of Clare. How much more satisfactory, not only to themselves, but to their country, would it now be, if the peasantry of that neighbourhood had adhered more to the peaceful occupations of the loom and the spade, and devoted less time and energy to the stormy arena of political strife.

About this time (1823) another attempt was made by a foreigner to introduce a new flax dressing machine. The reformer this time was an American farmer, from the State of New York, rejoicing in the euphonious name of Naman Goodsell. The machine is thus described in a communication from the English Consul, at New York:

"This machine is composed of an axle about six feet in length, made of iron or other substance, to which is attached two circular heads of iron, or other substance, of about two feet and a half diameter or more, which are connected by eight pieces or more of hard wood or iron, inserted in flanches, or flanges, on either head, and on coming even with the periphery of each wheel, the edges turned so as to form an obtuse angle. From one of the heads affixed to the axle projects a small drum of iron, or other hard substance, of about six inches in width, in which are fixed a number of teeth, or points, to serve as a hatchel, and from the other head projects a number of stats, or scutchers, turning at right angles, with the cylinder formed by the connexion of the other two heads."

After due investigation this machine was discarded as unfit for the treatment of Irish flax. The trustees of the Irish manufacture having formed a high opinion of the Dutch and Flemish systems of growing and managing the flax plant, and acting on the advice of their inspector, Mr. Besnard, brought over two Dutch "boers," or agriculturists, to instruct the Irish farmers in the Continental modes of operation. The improvements introduced by these were, I am sure, very useful; but after all, the defect in the management in Ireland in many parts occurred, I am afraid, more from want of care than from any want of intellect. The Dutch and Flemish have always been as noted for perseverance and industry as the Celt for the opposite qualities. In the North of Ireland the flax cultivation has always been more carefully and extensively conducted, owing partly to the steadier habits of the people, and partly to the proximity of the markets.

The London "Committee for Irish Relief" wrote from their office in Old Broad-street, London, to the Linen Board with some patriotic and sensible propositions regarding flax cultivation. The prospectus is dated March, 1824, and the following is an extract comprising the pith of the whole:—

"That the Trustees under the London Committee, or such other persons as they may wish to appoint in the several counties in these provinces, be empowered to take a quantity of land, not exceeding five acres each, to be sown with Dutch, Riga, America, and home saved seed, under the immediate inspection and direction of the Dutch farmers now in the service of the Linen Board, and in the after management to be treated according to their plan. That application be made to the Linen Board, to permit Mr. Besnard, and the Dutch farmers, to pay particular attention to the crops of flax grown under the immediate control of the persons appointed by the London Committee, and that further application be made to the Linen Board for a grant of a sufficient number of ripples and other implements, necessary for carrying into effect the Dutch plan for treating flax. That the several trustees, under whom flax may be cultivated, in the manner before described, shall be empowered to employ, for such time as may be necessary, twelve young men, inhabitants of each county in which the trustees reside, who are to attend the Dutch flax farmers, and be by them instructed in every process of treating the flax."

An anonymous French correspondent addressed the gentlemen of the Linen Board on the 26th November, 1824, with some novel proposals, but his letter, signed "Del," and dated from London, was not considered worthy of notice. A member of the Society of Friends, Mr. Edward Oillett, of London, was the next regenerator of the linen manufacture; he thus describes his invention to the Secretary of the Linen Board:—

"I have discovered a process, and reduced it to practice, which will render flax generally capable of being spun into a much finer thread than hitherto, and the finer sorts of flax may be made subservient, by fine manual spinners, to the manufacture of a fabric equal to French cambrics; also a thread suffici-

ently fine for the lace manufacturing. an article much wanted by the lace manufacturers here in England."

The trustees ordered that the papers regarding Mr. Ollett's propositions "should lie on the table." They are now perhaps safe in some of the pigeon holes devoted to the reception of such documents. I find early this year a kind of loom spoken of as likely to be very useful in the manufacture of sheetings, being so constructed that it can be set to throw any particular number of threads of weft into an inch without variation; it was called the "Dandy loom." An improved loom was also brought out by a Mr. Richard Robinson for weaving damasks and diapers; the cost was stated to be about £31. The priority of invention was disputed by Messrs. Coulson, Lisburn, County Antrim, and a memorial was sent forward by them to the Linen Board stating their views, viz:—

"The memoralists having recently heard that your Honourable Board have it in contemplation to encourage the introduction or extension of a machine called Jacquard, not hitherto in use in this country, as a supposed improvement in the manufacture of diaper and damask table linen, which machine is used on the continent in the weaving of silk, the memoralists beg leave respectfully to state that they did, a considerable time ago, erect one of those machines, which was the first brought into this country from the continent, although rather discouraged by its getting into disuse there in the manufacture of table linen, the German damask manufacturers preferring the *drawboy* system; this, with other plans for making damask without drawboys, they have been trying in various ways."

Genuine improvements in damask looms and weaving were also made by a person named Mc Cormes, and another named Foy, besides several other parties, most of whom were rewarded by the trustees from the funds at their disposal. There was some correspondence this year (1825) with a French gentleman, M. de Bergues, the sanguine inventor of a new and peculiar loom. The Linen Board ordered one to try its capabilities, but as no mention is made of any successes attendant thereon, I presume no result of moment was obtained. In the latter part of the previous year (*i. e.* 1824), the idea of erecting a large flax spinning mill was very popular among the most intelligent members of the linen trade. A joint-stock company was contemplated, but owing to the old-fashioned prejudices of several leading merchants who did all they could to damp the ardour of the so called speculators, the affair eventually fell to the ground. Had it been carried out, they might have become possessors of a large share of the immense wealth realised by the early flax spinning mills, and be classed among such millionaires as the present Marshalls of Leeds and Mulhollands of Belfast. "Parva parvos decent," the very idea of a large mill, alarmed those little minds accustomed to contemplate flax spinning by the primitive hand-wheel. I have the pleasure to mention that the ladies of Londonderry received many spinning wheels from Dublin about this time, and did much good by distributing them among the poor in their neighbourhood. To return, however, to flax spinning mills, I find that Mr. Kay, of Preston, obtained a patent for spinning fine linen yarn by machinery, and I believe it proved a very valuable discovery to the trade; some improvements were also brought into notice by Mr. A. Lamb, but I see no account of the practical result. These parties received countenance and support from the Linen Board, although an intimation had been made by Government that the grant for next year, 1827, would be reduced to £10,000. The trustees of course were compelled to reduce the expenses within that limit, and as a hint was given that the grant would soon be withdrawn altogether, a meeting was called to discuss the propriety of resigning their responsibility into the hands of the Ministry at once. A very able letter to the Linen Board, from Mr. Corry, the secretary, was read, in which occurs the following passage:—

"That the prosperity of the linen manufacture of Ireland has been greatly advanced by the wisdom of the laws which have governed it cannot be denied, but there is a popular opinion now abroad in which I feel that I participate—that, after a certain point of prosperity has been attained, the less any manufacture is encumbered with legislative regulations the better."

At this meeting it was decided to continue the duties of the Board till dissolved by order of Parliament.

They were not kept long in suspense. On the 6th of August, 1827, the Hon. Wm. Lamb (afterwards Viscount Melbourne) informed the trustees of the linen manufacture that no grant would be proposed for the year 1828, in the following terms:—

"I am commanded by the Lord-Lieutenant to request your early attention to the matter stated in a letter which by His Excellency's directions was addressed to your Board by Mr. Goulburn, on the 23rd of August, 1826, and to acquaint you that, in conformity to the direction of the Lords of the Treasury, and in pursuance of the principles laid down in the above-mentioned letter, it is not the intention of his Majesty's Government to recommend that any grant should be proposed to Parliament for the encouragement of the linen manufacture for the year 1828."

N.B. Errata in printing last letter.—Page 136, col. 1, line 72, for *friends*, read *funds*. Same page and line, col. 2, for *These names were B., &c.*, read *Their names were R., &c.*

THE CHARACTER AND HABITS OF THE EEL.

Sir,—The eel I consider, oviparous, inasmuch that it breaks out of the egg, or comes into life, in a *perfect form*, whilst other fish are imperfect for some 15 days or more, retaining an umbilical vesicle charged with fluid for the support until matured into form. The spawning of eels also differs from other fish (the lamprey and lampern excepted); it takes place in the autumnal season; when the rainy period arrives they migrate from the clear tributaries into the tidal river, and collect by hundreds upon a sharp scouring sand-bed, for the purpose of propagation. This is accomplished by a very peculiar effort which instinct dictates; they commence by burying their heads in the sand, beyond the gill cover, and, by a peculiar effort, blow the sand up, by which means any deposit of extraneous matter is washed away by the current and the sand left perfectly clean. Every species of fish prepares its bed or hill previous to spawning, instinct directing them that if not prepared their breed would be lost. With their heads buried in the sand, they entwine round each other with great pressure, expressing the egg and the milt for vivification when mixed in the water, the sand being blown up simply for the purpose of covering the eggs when they are emitted, and so imbed them for propagation.

The spawning period of the eel differs, from the same cause as other fish, namely from the freshes coming a little earlier, or a little later; but the usual period is the month of October. The egg remains in its bed until the spring of the following year, and in the month of April or May, according to the season, the brood may be seen winding up the river, to reach the tributary streams where the water is purer. After eels have spawned, they drop down to the coast, where they remain and grow to a large size; many gentlemen, with whom I am acquainted, have captured eels off Margate, Ramsgate, and other places, of 8 to 10lbs. weight; on the coast of the Bristol channel the fishermen take very large silver eels from among the rocks; and a few years back the small tidal stream at Lowestoft, was the scene of a strange and curious destruction to an immense mass of this description of fish, most probably from the effects of a violent thunder storm which broke over the district, of many hours' duration, and flooding the river to an excess, by which thousands were destroyed in one night, and of a size that the oldest fisherman was not aware of the like existing. Mr. Groves, of Bond-street, had a female eel in 1851, which weighed 11 lbs., and this year a gentleman, who owns a large salt-water lake in the South of France (Montpelier), stated to me that his keeper had speared a silver eel in those

preserves of the great weight of 30 kilogrammes. His remark was, that they could not be captured by any other method, as they broke away from everything, and, moreover, that they do not grow in length in proportion to their weight. These salt-water lakes are very extensive and shallow, not being more than three feet deep, and of some thousand acres in extent. They are enclosed from the sea during certain periods of the year, when the land waters and tributaries being emptied into them dilute the strong sea-water and thus admit of the eels breeding. As soon as the eggs come to maturity and the brood merges into life, they mount the tributaries in masses or by millions, stopping on their migratory course for nothing, climbing over water-gates, weirs, and other obstacles with a perseverance truly astonishing. Should the weather prove dry, and harsh winds prevail at the period of migration, hundreds of thousands perish as they climb up the gates, locks, posts, &c., with the assistance of their slimy coats, and when the slime is exhausted they stick fast, the next in succession passing over and onwards until in the same predicament, and at last the hindermost pass over thousands of their defunct and dying comrades until they reach the flowing current, when they proceed onwards up stream. Instinct, however, dictates to them to wait for the wet season of April before they move, when there is an increased supply of spring water, which is always warmer and purer than the land waters, and when also milder winds prevail. I believe I may say with truth, that Mr. Yarrel, so well known as an ichthyologist, has dissected more eels than any other scientific person, and for years past has proved that these fish have roe and milt. In order, however, to discover or see the roe or milt perfectly, I recommend the following simple method. Take the flange or lobe of roe or milt, and lay it upon some blotting paper, then place some blotting paper upon it, and add a slight pressure, which will express and absorb the fluids, and thus shew the egg or milt distinctly to the naked eye. In the Museum of the College of Surgeons there are several specimens of eels, lamperns, and lampreys, so prepared by Professor Owen that the forms of the ovariæ are most clearly delineated and developed, showing also a passage, canal, or duct, differing from other fish, through which the eggs and milt pass previous to being expressed for the purpose of propagation; thus all doubt may be set at rest as regards the propagation of eels from the egg.

Some three years back I was fortunate enough to obtain part of an eel cast from out of the river Thames, and as I wished the subject to be made known as much as possible, to substantiate the fact that eels come from an egg, I convinced my friends, from, or by, the following simple method:—The eel when it breaks through its egg-shell comes out tail first, and wriggles in the same manner as when struggling to get out of an eel pot, or basket. Upon my perceiving this first movement, I placed a small piece of stick immediately underneath, and raised the little eel breaking through its shell. By this process I invariably found the shell still covering the head and gill-cover of the then perfect little eel, which was as transparent as the water; and were it not for the circulation of the blood and the clear delineation, of the vertebræ, which is distinctly seen, it would be very difficult to discover them. They grow quickly, constantly burying themselves in the clear sand, and remain transparent for many days; they then change to a whity-brown, when the articulation of the heart and circulation of the blood are no longer visible, nor the delicate proportions of the vertebræ and fin rays of the flanges discernable. In a few days more they change to olive-green upon their backs, the bellies remaining beautifully white, from which they derive their name of silver eels. At this period they migrate up stream to the tributary streams and waters, where they remain about two or three years. They then descend and remain around the coast as before described, where they seem denizened to a new arrangement, and no doubt breed in the fresh or spring water which is constantly being emptied into the sea and trickling down the coast. It is my perfect conviction, that not even the fish which are captured in the sea could be bred out of the egg in heavy salt or sea water, and for which reason the spawners all come to the estuaries to deposit their eggs. All estuaries are diluted by the reflux of the land waters, the ebb flowing four hours longer than the flood in the twenty-four hours, so that the estuaries are one-sixth less saline, and sometimes less, according to the period of the year, than the deep sea water. I have proof that sea-fish eggs will not breed out in deep sea or excessive salt water, but will remain in *statu quo* until fresh or sweet water is added, and then life soon appears.

If you deem this communication of interest I shall be happy to contribute further, and attempt to show the value of protecting all waters for fish culture.

I remain, yours obediently,

G. BOCCIUS.

IS DEGRADING HUMAN LABOUR ESSENTIAL TO NATIONAL PROSPERITY?

SIR,—As human labour is an essential element in the prosecution of Arts, Manufactures, and Commerce, it is a legitimate subject for discussion in your journal. Human labour economised, *i. e.*, with a surplus remaining after maintaining the labourers, is the creator of capital; and the greater the proportional surplus the more rapidly will capital multiply, provided always that the labourers consume sufficient of their earnings to maintain them in a state of progress in education, and with good lodging, clothing, and food, so as to ensure sound minds in sound bodies. If this were compatible only by consuming the whole of their earnings, even this would be better than the creation of capital by pinching their consumption, so that the nation might be composed of a small number of rich intelligent citizens and a mass of pauper slaves, such as were the populations of the ancient world, such as are the slave nations of the modern world in the tropics, in the torrid zone, and elsewhere. Only one consideration can warrant the condition of under-fed slaves, the creation—not attainable in other ways, of an intelligent race, from whom, directly or indirectly, intentionally or unintentionally, intelligence might spread through the nation, or the human race. It is important in time of trial that the captains, officers, and generals, by sea and land, should be provided with full rations, to keep their minds and bodies in health, however the masses may suffer, though even then a frugal use of the provisions by the leaders, indicative of their sympathy with those below them, has a valuable moral effect.

There is an axiom that "slave labour does not pay," but it is an axiom that does not hold good in all cases. Slave labour does not pay in competition with free labour of an intelligent community, where all other circumstances are equal; but extensive slave labour does pay a small number of proprietors who give nothing but their food to the slaves, and can cause them to produce a surplus. Slave labour paid the proprietors of Greece and Rome, and maintained them in a condition of luxury, and maintained even large populations with mere food in a state of idleness; white labour in England, enforced by the pressure of want, has enabled cotton mill owners to accumulate a large national capital out of the surplus earnings of underfed men, women, and children. It is true that the blacks are legally slaves, and the whites are legally free; but if by coercion, whether of law or want, their physical and mental conditions are of an equally low standard, the practical result is the same, and a mischievous result to the nation; for black slaves, in a condition of misery, massacre their owners, as at St. Domingo; and white workers, in a condition of misery, keep their employers in a normal condition of uneasiness,

unfavourable to the increase of capital. Only when the workers are in a happy and thriving condition can a nation and the employers amongst a nation be in a prosperous state. Now there are enlightened employers who seek to advance their workmen to the prosperous condition, and there are also rude and uneducated employers who seek to keep down their workers, and maintain them in a condition analagous to black slaves.

Now, as a man in business rarely thrives by the advent of poor customers, neither can a nation thrive by any multiplication of underpaid workmen. A comparative small number of well paid workmen, with their labour multiplied by machinery, will leave a larger surplus capital than a large number of underpaid workmen. But after the machinery has been produced, it is quite possible that the increase of numbers in competition may keep down wages, and the producer of 50 articles by machinery may get no more than the producer of one by hand.

Under the law of unlimited competition amongst the numbers of workmen in England, it is difficult to provide for this case, because the large capitalist has any interest in keeping out small competitors, in which the existing law of partnership, unnecessarily multiplying risk, materially helps him. In the United States free partnership, and a wide and rational protection of mental property, and abundant land, whereon to take refuge when work is scarce, and wages have a tendency to lessen, prevents the degradation of the workmen. If England were inexpansible by means of ships and colonies, a condition of competitive oppression, constantly widening, would induce revolution ultimately. We should come to the condition of the old Greek States, and laws would be enacted interfering with the liberty of the subject, or citizen, for the sake of national safety.

We do at present, to a certain extent, interfere with the liberty of the subject. We decree by law that fathers and mothers shall be bound to maintain their children in a sanitary condition, to the extent of their means; and we decree also, that they shall not work their children in mills more than a certain number of hours per diem. There are two reasons for this, the alleged reason, on the score of humanity, to save children under age from slavery and cruelty till they are responsible agents in the eye of the law. There is another reason, on the score of political economy, that a race of people shall not be continually on the increase in a condition of physical disease and mental inaptitude, to over-run the country with paupers. At the establishment of the new police, the law decreed that vagabonds should not dwell and multiply their numbers beneath the dark caverns of the Adelphi, and similar places. Sanitary regulations now prescribe, that neither an Englishman's nor an Irishman's house is "his castle," if he lodges more than a certain number of human beings to the hundred cubic feet, and if he fails to keep "his castle" free from miasma. The law decreed that even the institution of property shall break down if the property assume the form of a manure heap in a back-yard to the detriment of his neighbours. The law decrees, that children of a certain age should not be permitted to ascend chimneys, even by their own consent, and possibly only left the option to the children of larger growth in consideration of its practical impossibility. In all these cases the law interferes with the liberty of the individual for the benefit of the mass, and hitherto there has been no apparent evil resulting from the interference. Our national capital is still on the increase, and the exclusion of children has called attention to the improvement of machinery.

The law is just beginning to decree that brutal men shall not exercise unlimited coercion over the women who nominally serve them (either legally or illegally) as wives,—who in reality serve them as slaves, because this brutality tends to degrade general society. Perhaps, in time, the law will also decree that a woman shall be the legal proprietor of her own earnings, for the maintenance of her own children, and not be subjected to have them taken from her by a brute, claiming, under a kind of legal fiction, to be her husband.

The law interferes to prevent the practising of noxious trades in the vicinity of towns, to prevent slow physical poisoning. It also interferes to prevent moral poisoning by noxious publications. The law also says that human beings shall not die of starvation, compelling their maintenance in want by general society, subject to getting out of them what is practicable in the shape of earnings. This maintenance of paupers is considered to be a tax of more or less intensity on the industrious.

It is clearly a desirable thing to prevent the growth of paupers. Now, leaving out of the question the halt, and blind, and maimed, it seems quite clear that paupers chiefly come into existence, like other undesirable races, from predisposing causes, and those causes capable of prevention. Rats are largely produced in drains, in which exuviæ valuable for agricultural purposes are wasted. From these, their indigenous haunts, they spread forth, and take to buildings, and ships, and granaries. Gnats grow on stagnant waters and marshes which men have not the wit or energy to dry up. Fleas, flies, and other vermin harbour in uncleanly houses; snakes, lions, and tigers in the jungles.

Is the answer difficult as to whence come the races of paupers? No. They are a consequence of the existence of employments that provide an insufficient portion of the means essential to man's well-being. Lacking the needful supply of food, clothing, and lodging, people fall into a state of disease and relaxed energy; and they generate others in the same condition, who are brought up to precisely the same "shiftless" processes, an ever increasing weight on the pauper fund, and they are even augmented by those who fall down from a condition of opulence to that of want.

What, then, are these employments? Those requiring nothing but the lowest kind of finger skill. Shirtmaking, shoebinding, and such trades, at which, it is said, a woman can only earn 4s. 6d. a week of 72 hours' work, while bread is at 2d. per lb.

But it will be argued that while manufacturers are willing to employ such people, and they are willing to work, it would be interfering with the freedom of industry, as well as the liberty of the subject, to prevent them. This is merely arguing that manufacturers can be found willing to gain a per centage by the creation of a huge pauper nuisance, leaving it to the community to pay the damages of their maintenance when they are past work, or when their employment alters. Master chimney sweeps thought it an iniquitous hardship and interference with the rights of Britons, when they were precluded from converting little children into decripid dwarfs; but the thing was insisted on, and helped toward the practice of fire-proof buildings. It was the disregard of the essential conditions pointed out—sufficient food and maintenance, that converted Ireland into a pauper warren, decimated her, and extinguished the indigenous race of landlords.

Now, why should individual manufacturers be allowed to do that which is forbidden to general landlords. Such work is practically the same as that formerly was of paying an agricultural labourer partly by his employer and making it up from the parish. The stitching employments are worse than this, for they attract a larger number of the helpless to the path of disease. It were better in an economical point of view to proclaim that no trade should be carried on at less wages than would furnish a given quantity of wheaten bread per week to the individual working. I am aware that objections may be raised as to provision for children who do not work, and the impossibility of paying different wages to single and married, and, we may add, the injustice of so doing. But there is a broad principle to be served. Messrs. Woodscrew and Co. clear some thousands per annum by a business which draws healthy vitality out of young women and children, "giving employment to thousands," and the country subsequently pays many more thousands in the process of

maintaining and burying them, when Messrs. Woodscrew and Co. have done with them.

But the country would be without its supply of cheap garments. Better that it should,—better that it should continue to wear its old clothes for two years in succession, till the machinist had supplied them, and left scope for larger wages. Not by Lord Ashley's charity, "giving good wages to professed sempstresses," can the evil be remedied. That is merely a premium to others to flock in,—a premium to the world's pauperdom. The only remedy is to prohibit by law—not merely stitches by hand, for the machine will do that—but all processes that tend to weaken and degrade the human faculties, whether by poisonous action or insufficient wages. To confine the question to children is mere casuistry. Men and women, who can be easily degraded, are but children of a larger growth, and need looking after. Many an American lad, "on his own hook," at 14, has more shrewdness and knowledge than English weavers and stitchers at 30. We do not hold that even a rich man has a right to do as he will even with his own life, for in case of *felo de se* the law confiscates his property, and buries him in a cross road, pauperising his family. Why, then, should we suffer a dry grinder, or a weaver, or a stitcher, to slay himself by slow processes, because some unfair manufacturers hold out a fictitious bait.

But this, it will be argued, is an interference with free trade. Not so! It is rather a removal of protection from those who manufacture cheaply at the cost of ignorant people, and make the parish suffer for their gain. If free labourers were imported from Africa it would probably be as an experiment, with a guarantee to send them back to their own country better off than when they arrived. Sufficient rations for them would be imperatively demanded as with Hill Coolies, and why should English work people to be on a worse footing.

The argument resolves itself into this. Amongst the educated portion of the community there is a strong moral sense that repugns the idea of descending in the scale of comfort, and they resist. The uneducated submit, and increase and multiply and die more rapidly, till the average age of man is 19 in Bethnal green and 37 at Kensington. It would, therefore, be sound political economy for the community to say, upon the whole, we will give up the employments that kill people off at 19, till they shall be so improved as to enable them to live to 37. It would be a most desirable thing if the Institutions in Union could, amongst them, furnish a compendium of—

The maximum number of persons employed in each handicraft work.

The proportion of men, women, and children, and their respective ages.

The wages per week of each, and the time, maximum and minimum.

How many are employed of one family, and the aggregate wages.

At what age they are put to the employment, and how long they continue in it.

How long they live after they are past employment.

What classes of diseases they suffer under.

The corresponding prices of food at the periods of wages.

What medical help they resort to.

How they are buried.

It is quite obvious, that if a large number of unhealthy, squalid foreigners, from the low districts of Saxony or elsewhere, were gradually stealing in and swamping us, we should soon ask for an account of the manufacturers' proceedings. If healthy maintaining wages were paid, we should have no reason to interfere, and there is no reason why manufacturers should be permitted to do with our own people what they would not be permitted to do with foreigners—swell the pauper list. It is a proud boast, that we have doubled our numbers in these islands by manufacture and commerce, but only on the supposition that they be in an improved condition of comfort from what we set out with. That they are so generally, few can doubt, but complaining stitchers, and turned-out weavers, and ground-down shoebinders, and half-rotten makers of lucifer matches, are blots upon our system, not consistent with true and sound doctrines of political economy. These practices are based on the slaveowners doctrine, "Better buy than breed."

I shall be glad to hear the opposite side to these arguments set forth.

I am, Sir, yours faithfully,

W. BRIDGES ADAMS.

1, Adam-street, Adelphi, March 14, 1854.

Proceedings of Institutions.

BARNSLEY.—The balance-sheet of the Mechanics' Institute and Literary Society for the past year, shows the gross expenditure to have amounted to £148 15s. 3d., and the income to £154 9s. 5d., leaving a balance of £5 14s. 2d. in favour of the Institute. The total number of members of all kinds is 290, being an increase of 44 in the year. The number of volumes added to the Library was—by donation, 8, by purchase 88; it now consists of upwards of 1200 volumes. Six professional lecturers were engaged at an expense of £25 18s. 0d., and five gratuitous lectures. It is intended to establish an Elementry Drawing Class, as soon as the Department of Art can afford the requisite aid for that purpose, and it is hoped that a Penny Savings Bank in connection with the Institute may shortly be opened.

BRIGHTON.—At the third annual Soirée of the Mechanics' Institution, which was held in the Town Hall on Monday, the 20th ult., upwards of 2000 persons were present, and it is believed that between £40 and £50 will be realized to the funds of the Institution. The entertainments comprised an exhibition of works of Art, a concert, and a ball.—During the evening addresses were delivered by Major Fawcett and Mr. O'Brien; the chair being occupied by J. Coody Burrows, Esq.

BROMSGROVE.—A correspondent writes that the Literary and Scientific Institution recently held its annual *soirée* and Exhibition; that "it was very successfully carried out, in a locality where, it must be confessed, literature and science have visited the homes of but few of us. It is, however, gratifying to see that the uninitiated, when such visitors cross their paths, recognise them with obvious pleasure. There is no similar Society so humble but it may effect something of the like description; and I believe there are no means so powerful in stirring up the attention of towns to the realities that exist amongst them. As a member of our Literary and Scientific Institution, I last year commenced the trial of what could be done in the formation of an Exhibition. The National School Room was granted; the desks formed tables round it; the forms of course were useful. The drapers lent covering and crimson material for dressing round the top of the room. Gentlemen lent their pictures, ladies their drawings, and thus the walls were covered. Sportsmen lent their stuffed birds and quadrupeds, juvenile entomologists their cases of insects, and geological specimens also were borrowed. The vegetable kingdom was represented by the needlework of ladies, young and old. Philosophical instruments were drawn from the windows of druggists and others, and thus galvanism and electricity were in action, much to the amusement of the juveniles. The microscope and stereoscope were not wanting, and the friends of old soldiers and sailors sent in antique swords, guns, tomahawks, manacles, and other outlandish curiosities. With this display, with music, with a tea room in addition, half-filled with laurels and flowers, and presided over by several ladies desirous of lending assistance to rational entertainment, and the dissemination of knowledge (who by the bye borrowed china, urns, and other of the requisite paraphernalia); and to crown all, a nobleman (Lord

Lyttleton) presided, and discanted freely on what had been placed before him; and as the very borrowing had excited an interest in what was to be done, everybody, it may be said, went to see the show. They saw what they had never seen before, and many became possessed of knowledge that never before had shed a ray of light upon their brain. The most intelligent, too, lifted their hands in wonder, although none but things that were common had been placed before them.

CHELTENHAM.—A course of free lectures to working-men is being delivered in the lecture-room of the Literary and Philosophical Institution, by the Rev. C. H. Bromby, A.M., Professor Ronna, B.L., and Dr. Wright. The opening meeting was on the 8th ult., when addresses were delivered "On the Objects and Advantages to be derived by Working Men from the Study of the Elements of the applied Sciences." Since that date the lectures have taken place weekly. "The Air—its Chemical Properties," by the Rev. C. H. Bromby; "its Physical Properties," by Professor Ronna; "and its Relation to Animal and Vegetable Life," by Dr. Wright, formed the subjects of the three first lectures. The fourth was "On Organic Chemistry, in Relation to Animal Food." by the Rev. C. H. Bromby.

DEPTFORD.—A Musical Lecture was given at the Institution, on Wednesday, February 22nd, by Mr. W. T. Veness, assisted by about twenty-four members of the Choral Society. The illustrations were entirely of the Glee and Madrigal class, and were effectively performed; and two of them, viz., Festa's Madrigal, "Down in a Flowery Vale," and Stevens's Glee, "From Oberon," were re-demanded. The lecture was pleasantly interspersed with anecdote and quotation, and received the greatest attention from an audience of from 600 to 700 persons.

To Correspondents.

ERRATUM.—In last number, page 287, col. 1, line 7, for about 1,000,000*l*., read about 12,000,000*l*.

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Mr. W. H. Monk, "On Chamber Music."
Statistical, 8.—"On the Relation of the Price of Wheat to the Revenue derived from Customs and Excise Duties."
Chemical, 8.
British Architects, 8.—Mr. W. A. Boulnois, "The Drainage of Buildings and Streets in the Metropolis."

TUES. Royal Inst., 3.—Prof. J. Tyndall, "On Heat."
Horticultural, 3.
Pathological, 7.
Civil Engineers, 8.—1. Mr. E. Laforest, "Martin's Improved Jacquard Machine." 2. Mr. D. K. Clark, "Ruthven's Propeller."
Linnean, 8.

WED. London Inst., 2.—Mr. E. W. Brayley, jun., "On Physical Geography."
Royal Soc. Literature, 4½.
Society of Arts, 8.—Dr. Buist (of Bombay), "On Some of the Undeveloped Resources of India."
Geological, 8.
Archeological Assoc., 8½.—Mr. F. J. Baigent, "On the Martyrdom of St. Thomas of Canterbury, and other Paintings discovered at St. John's, Winchester.

THURS. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
Numismatic, 7.
London Inst., 7.—Prof. J. Tyndall, "On Magnetism and Electricity."
Antiquaries, 8.
Royal, 8½.

FRI. Philological, 8.
Architectural Assoc., 8.—Class of Design.
Royal Inst., 8½.—Dr. E. Lankester, "On the Structural and Physiological Distinctions supposed to limit the Vegetable and Animal Kingdom."

SAT. London Inst., 2.—Mr. E. W. Brayley, jun., "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-Metallic Elements."
Royal Botanic, 3¾.
Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 9th March, 1854.

Par. Numb.
87. Poor Law (Orders of Removal)—Returns.
88. Committee of Selection—Fourth Report.
90. Poor Law—Copy of Memorandum by Sir George Nicholls, on Settlement, &c.
Loss of the "Olinda."—Captain W. H. Walker's Report.

Delivered on 10th March, 1854.

20. Duchy of Cornwall—Account.
83. Smithfield Market—Copy of Correspondence.
89. River Murray, Australia—Copies of Despatches.
96. Railway and Canal Bills Committee—Second Report.
Tithe Commission—Report.
Oxford and Cambridge Universities—Correspondence. Part 1. University of Oxford.
Tynemouth—Report of the Commissioners.

Delivered on 11th and 13th March, 1854.

79. Metropolitan Police—Accounts.
97. Committee of Selection—Fifth Report.
38. Bill—County Court Extension Act Amendment.
Highways—(Receipts and Expenditure)—Abstract of the General Statements.
Chancery Commission—Second Report.
Copyholds—Twelfth Report of Commissioners.

Delivered on 14th March, 1854.

SESSION 1852-53.

955. Friendly Societies (Sickness and Mortality)—Mr. A. G. Finlaison's Report, &c.
976. Poor Law Medical Officers—Return.

Delivered on 15th March, 1854.

85. Highways (South Wales)—Statements.
91. Drainage Works (Shannon)—Copy of Memorial.
95. Joint Stock Companies—Registrars.
78. Sligo Borough Election—Report from Committees.
39. Bill—Ministers' Money, &c., (Ireland.)

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, 10*th March*, 1854.]

Dated 21st October, 1853.

2464. C. N. Michel and A. Lecomte, Paris—Windows.

Dated 21st January, 1854.

145. M. L. L. Beaudeloux, Paris—Self-acting cradle.

Dated 20th February, 1854.

395. J. R. Hill, 39, Princes street, Stamford street—Pulverizing metallic ores.
397. W. H. Barlow, Derby—Connecting rails of railways.
401. J. Chisholm, Holloway—Purification of gas.
403. H. Hilliard, Glasgow—Table cutlery.
405. W. Milner, Liverpool—Locks.
407. J. Urie, Glasgow—Photographic pictures.

Dated 21st February, 1854.

409. F. Osbourn, Aldersgate street—Cutting out of garments.
411. J. Gedge, 4, Wellington street South, Strand—Gas fittings. (A communication.)
413. S. T. Jones, 3, Union court, Old Broad street—Washing minerals.
415. J. Boydell, 65, Gloucester crescent, Regent's park—Hurdles and gates.
417. J. Smith, Glasgow—Ornamental weaving.
419. A. Dixon, Smethwick—Railway axle boxes and bearing springs.
421. A. B. Baron von Rathen, Wells street—Omnibuses.
423. W. C. T. Schaeffer, Stanhope terrace, Hyde park gardens—Recovering fatty matters in woollen mills.

Dated 22nd February, 1854.

424. W. E. Newton, 66, Chancery lane—Fire-arms and projectiles. (A communication.)
425. J. Morison, Paisley—Globes.
426. E. Taylor, Kinghorn, N.B.—Gill-heckles.
427. D. Assanti, Upper Berkeley street—Waterproofing porous substances.
429. S. Colt, Spring gardens—Rifling fire-arms. (Partly a communication.)
430. J. de W. Spurr, 16, Kenyon terrace, Birkenhead—Distilling coals.
431. J. Boydell, 65, Gloucester crescent, Regent's park—Carriages.

Dated 23rd January, 1854.

432. T. Settle and P. Cooper, Bolton le Moors—Preparing, &c., cotton, &c.
433. A. Oppenheimer, Manchester—Mohair velvet or plush.
434. T. Robinson, St. Helen's—Raising and lowering goods.
435. J. Barling, 7, High street, Maidstone—Paper from hop-bine.
437. T. D. Purday, Rupert street, Haymarket—Cooling liquids, &c.
438. W. Hunt, Wednesbury—Utilizing ammonia given off in manufactures.
439. H. Stoy, 1, St. John's road, Battersea rise—Stopping engines and carriages.
440. E. Foard, 39, Nicholas street, New North road—Furnaces.

Dated 25th February, 1854.

441. P. Fairbairn, Leeds—Winding slivers, &c., into laps or balls.
442. W. and J. Ryder, Bolton le Moors—Composition for coating metals.
443. E. Kingsbury, Knightsbridge—Apparatus for indicating rise or fall of water.
444. S. L. Hardy, M.D., Dublin—Applying chloroform.
446. C. Cowper, 20, Southampton buildings—Furnaces. (A communication.)
447. C. Cowper, 20, Southampton buildings—Potash and soda. (A communication.)
448. J. Banfield, Birmingham—Communicating with guards and drivers.
451. C. J. Fisher, Temple—Detecting forged notes, &c.
452. E. H. Bentall, Heybridge, Essex—Ploughs.
453. E. Power and T. Knowles, Birmingham—Watches, &c.
454. T. Forsyth, Wolverton—Furnaces.
455. A. E. L. Bellford, 16, Castle street, Holborn—Dressing stone. (A communication.)
457. A. E. L. Bellford, 16, Castle street, Holborn—Power from heated air and gases. (A communication.)
458. J. Barker, J. Andrew, and W. Hayes, Salford—Cleansing wool, &c.
459. C. W. Siemens, Adelphi chambers.—Electric telegraphs. (Partly a communication.)
461. G. Collier, Halifax—Twisting fringes.
462. J. Keenan, Paris—Blocks for printing. (A communication.)
463. C. F. Bekaert, 10, Rue de la Victoire, Paris—Oxigenated oil. (A communication.)
464. C. Lamport, Workington—Ship-building.
465. J. Boydell, 65, Gloucester crescent, Regent's park—Hurdles and fences.
466. J. Elder, Glasgow—Marine engines.
467. A. Plantin, 25, Thayer street, Manchester square—Stopping, &c., trains.
468. W. E. Staite, Manchester—Preparation of madder and munjeet for dyeing.
469. F. Westbrook, Kensington—Cleaning of windows.

Dated 27th February, 1854.

471. P. Fougerat, Bordeaux—Paddle wheels.
472. J.D.M.Stirling, Larches, Birmingham—Tubes and cylinders of steel.
473. C. de Bussy, 45, Mornington road, Regent's park—Amalgamation of gold ores.
474. J. H. Johnson, 47, Lincoln's inn fields—Harrows. (A communication.)
476. J. Morrell, Bradford—Stopping tap of any vessel after quantity required is withdrawn.

Dated 28th February, 1854.

480. E. and J. Marsden, Liverpool—Pumps.
482. J. H. Rehe, Bayswater—Crushing, &c., substances.
484. C. Mather, Salford—Valves for steam.
486. W. Patten, 22, Old Fish street—Valves for water.
488. E. C. Shepard, Trafalgar square—Decomposing water. (A communication.)
490. T. J. Johnson, 19, Booth street, Spitalfields—Roasting malt.
492. J. H. Johnson, 47, Lincoln's inn fields—Art of reading. (A communication.)

; *Dated 1st March*, 1854.

494. J. T. Cortin, 64, New Compton street—Soleing shoes and boots.
496. C. Hargrove, Birmingham—Furnaces.
498. T. H. Ewbank, South-sq., Gray's inn—Terry or looped fabrics.
502. W. and J. Clibran, Manchester—Regulating pressure of gas from main.
506. T. Metcalfe, 19, High street, Camden town—Folding bedsteads, &c.

WEEKLY LIST OF PATENTS SEALED.

Sealed March 10th, 1854.

2089. Arthur Warner, 34, Dorset place, Dorset square—Application of the fibrous part of the palm tree and leafs to arts and manufactures

Sealed March 11th, 1854.

2107. John Lilley, junior, of Jamaica terrace, Limehouse—Improvements in mariners' compasses.
2118. Alexander Allan, of Crewe—Improvements in locomotive and other boilers for generating steam.
2127. Philip Webley, of Birmingham—Improvements in repeating pistols and other fire-arms.
2144. Thomas William Keates, of Chatham place, Blackfriars—Improvements in the distillation of turpentine and other resinous substances and their products.
2164. Jonathan Burton, of Crawshaw Booth—Improvements in shuttles for weaving; the whole or part of which are applicable to skewers used in winding and reeling machines.
2169. Richard Archibald Brooman, of 166, Fleet street—Improvements in the manufacture of soap and saponaceous compounds.
2204. Alexander Dalgety, of 76, Florence road, Deptford—Improvements in lathes.
2220. Louis Dominique Girard—Improvements in hydraulic engines.
2221. John Barsham, of Kingston upon Thames—Improvements in the manufacture of bricks, tiles, and blocks.
2240. John Taylor, of Princes square—Improvement in the treatment or preparation of skins.
2252. William Brown, of Bradford—Improvements in apparatus used in washing wool and other fibrous material.
2283. Joseph Henry Cary, Norwich—Improved pianoforte action for upright pianofortes.
2933. Charles Goodyear, of Saint John's wood—Improvements in the treatment and manufacture of india-rubber. (Partly a communication.)
2948. John Tribelhorn, of St. Gall, and Dr. Pompejus Bolley, of Aarau, Switzerland—Improvements in the process of bleaching vegetable fibrous substances. (A communication.)
2985. Francis Bennoch, of Wood street, Cheapside—Improvements in coating silk and other yarn or thread with gold or other metal.
3014. Henry Jackson, of High street, Poplar—Improvements in machinery for moulding bricks and other articles of brick earth.
3033. John Pym, of Pimlico—Improvements in machinery for grinding auriferous and other ores and separating the metal therefrom.
3035. Alfred Trueman, of Swansea, and Isham Baggs, of London—Improvements in grinding, amalgamating, and washing quartz and other matters containing gold.
63. Joseph John William Watson, of Old Kent road—Improvements in signalling.
162. John Lockhart, junior, of Paisley—Improvements in the manufacture of bobbins.
168. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in machinery for bending metal and producing forms thereon by pressure.

Sealed March 13th, 1854.

2119. James Hill Dickson, of Evelyn street, Lower road, Deptford—Improvements in machinery or apparatus for the preparation of flax and similar fibrous material.

Sealed March 14th, 1854.

2128. John Timmis, of Stafford—Improvements in safety valves for boilers.
2129. Alexander Wallace and George Galloway, both of Glasgow—Improvements in the construction of portable articles of furniture.

Sealed March 15th, 1854.

2141. Eliezer Edwards, of Birmingham—Invention of a new or improved gas stove.
2143. Henry Kraut, of Zurich—Improvements in tools or implements to be used for boring or cutting rock, or other hard substances, for the purpose of blasting.
2147. Henry Jeanneret, of Great Titchfield street—Improvements in machinery for digging and tilling land.
2152. David Mushet, of Coleford, Gloucestershire—Improvements in steam-engine boiler and other furnaces.
2159. Alexander Thomson and David Lockerbie, both of Glasgow—Improvements in kilns for baking and burning articles in earthenware.
2160. John Adcock, of Marlborough road, Dalston—Improved apparatus for measuring the distance travelled by vehicles.
2166. Christopher Nickels and Ralph Selby, both of York road, Lambeth—Improvements in the manufacture of flexible tubes and bands, and in covering wire.
2172. William Lamplier Anderson, of Norwood—Improvements in propelling ships and other vessels.
2270. James Lee Norton, of Ludgate Hill—Improvements in instruments or apparatus for measuring and indicating the distance travelled by carriages, and in the means of transmitting motion thereto from the running wheels.
2783. Peter Armand Le Comte de Fontaine Moreau, of South street, Finsbury—Certain improvements in the construction of the Jacquard machine. (A communication.)
97. William Crosskill, of Beverley, Yorkshire—Improvements in the construction of portable railways.
107. William Crosskill, of Beverley, Yorkshire—Improvements in the construction of carriage wheels to run on railways and ordinary roads.
115. Edward Lord, of Todmorden—Certain improvements in looms for weaving.
181. John Bapty, of Leeds—Certain improvements in machinery for preparing to be spun, wool, and other fibrous substances when mixed with wool.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854. March 10.	3575	Hill's New Camp Bedstead	John Hill	212, Piccadilly.
" "	3576	Surface Draining Plough....................	Thomas Jenner	High street, Southover, Lewes, Sussex

Journal of the Society of Arts.

FRIDAY, MARCH 24, 1854.

FIFTEENTH ORDINARY MEETING.

WEDNESDAY, MARCH 22, 1854.

The Fifteenth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 22nd instant, WILLIAM BIRD, Esq., in the chair.

The following candidates were balloted for and duly elected:—

Harvey, Henry
Rushton, Thomas George Alfred
Manchester, Right Rev. the Lord Bishop of

The following Institutions have been taken into Union since the last announcement:—

352. Cirencester, Permanent Library.
353. Greenside, (Ryton, Newcastle-on-Tyne) Library.
354. Wordsley, Library and Reading Association.

The Paper read was:

ON SOME OF THE UNDEVELOPED RESOURCES OF INDIA.

By GEORGE BUIST, M.D., of Bombay.

When the climate, geography, or government of India are spoken of at home, it seems generally to be supposed that the country is one of uniform character and moderate dimensions, compact, accessible, and well and universally known to us. It seems scarcely ever to be recollected that this vast territory embraces an area of 1,309,200 square miles, surrounded by a boundary line of 11,260 miles, or nearly half the circumference of the globe. Of this 800,758 square miles belongs to England, 508,422 square miles to native states. It is close on the area of Europe, which is in all 2,793,000 square miles, less the wastes of Russia, Sweden, and Norway, or without these 1,035,300 square miles. Over this enormous country, stretching from 8° to 32° north, and rising from the sea level to an altitude of 28,000 feet, far within the region of the perpetual snow, in which every conceivable variety of climate, soil, and production prevail, there are in all about 60,000 Europeans to about 200,000,000 natives, of which about 50,000 are private soldiers or residents of the presidencies, and about 13,000 servants of the government, or one man of education and intelligence, to every thousand square miles. But, thus scattered and separated as they would require to be before this average was supplied, affords a most erroneous view of the state of matters as it actually exists. Europeans are, in reality, massed together at the presidencies and principal military stations; they are never found in parties of less than four and five; generally they are in groups of many times this number, and over India at large so much as one station where any European of intelligence resides will scarcely be found in every 10,000 square miles requiring to be examined, the climate offering the greatest obstructions for man moving about in the day time in the open air. Every year, as might under these circumstances be expected, brings whole divisions of knowledge within a reach wholly new to us, and, as yet, we are only beginning to become acquainted with the grand features and vast resources of the country. As was well remarked by Sir Charles Trevelyan, in his evidence lately published, the produce of India yielding about twenty millions of exports annually, and the revenues affording nearly a similar amount, form but an inconsiderable fragment of what may be expected to be realised when proper means are adopted for their development. In 1778 the culture of indigo in Bengal scarcely covered its own expenses; thirty years afterwards 72,000*l.* worth were exported annually, and this has risen to the present time to the enormous sum of 1,717,833*l.* per year. It was in 1788 that cotton imported from the East Indies first made its appearance in the English market. By the time the Company's monopoly was relaxed, in 1814, it amounted to 4,000,000 pounds sterling, and it now averages from one hundred and sixty to one hundred and seventy millions of pounds sterling, for the cultivation of which an area of 8,000 square miles is required.

The most extraordinary instance of the recent appearance of a trade of enormous magnitude of a commodity unknown to us is furnished by gutta percha. This invaluable substance first made its appearance in the home market in 1847. It is now used for almost every purpose of manufacture, the demand for the raw material being such as to threaten in a few years to extinguish the supply unless new sources be opened up, or new varieties of material be resorted to as a substitute. Oil seeds, many of which have but recently made their appearance among our exports, have of late years become large articles of merchandise, and from 30 to 40,000*l.* worth of linseed alone are annually shipped for England from the single port of Bombay. Within the past ten years the manufacture of coir mats and stair-carpets has been introduced into this country. The raw material chiefly comes from Ceylon, and I can find no return of its value, but the out-turn of the manufacture in this country exceeds, I have great reason to believe, 100,000*l.* a year. But it is not so much in the material we possess as in the enormous amount of untutored and unemployed labour at our disposal, that India promises to become a field for productive enterprise. The wants of the natives are so simple and so few, and the supplies of food and clothing, such as they desire, so cheap and plentiful, that they require much stronger incentives to exertion than they have hitherto possessed before they will be induced to exert themselves as they ought,—a higher order of industry, a larger remuneration than they have been accustomed to, and a better means of transporting the produce of their labour to a profitable market than they at present possess. The happiness of human life mainly consists in the multitude of incidents, and the amount of innocent excitement comprised in it, and there is no doubt the natives would be many times as happy and wealthy as they now are were they only taught how profitably to exert themselves, and stimulated to exertion by the fruits of industry being rendered profitable to them.

An excellent sketch has been given by Dr. Royle of the most productive of our existing known resources, so far as these have already been improved; to attempt a notice of those requiring to be developed, or capable of profitable development, would be to assume an amount of information, to the possession of which no individual can pretend, and to aspire to the solution of a difficulty, time, experience, and investigation alone can solve.

On the grand scale, it will be allowed on all hands, that the three things mostly required are—1st, the opening up of the country by roads and railways; 2nd, the improvement of its fertility, by means of irrigation and improved methods of culture; and, 3rdly, the general enlightenment of the people, so that they may learn to see their way and think for themselves, to rely on their own reflection, industry, and resources, in place of following, as heretofore, the beaten paths of custom, or endeavouring perpetually to lean on the arm of Government for aid in things which they themselves were perfectly capable of accomplishing.

Limited in extent and short in duration as our experience in railway making has been, it has proved in the last degree encouraging to us. The vast physical difficulties, so often represented as all but insurmountable, have been found to vanish the moment they were faced, and to have been little better than creatures of the imagination. The natives, of all descriptions, have shown an extraordinary aptitude for the performance of almost

every kind of work, whether in the mere drudgery of cutting and embanking, or in the most difficult departments of tunnelling, bridging, and wall building; and the result has been, that the work has reached, or surpassed, the highest standard of excellence the most ambitious of our engineers had aspired to, and been executed at a cost greatly below the sum estimated. Nor is this all. Though only twenty-two miles of rail have as yet been in use, and this for the space of no more than ten months, the fragment betwixt Bombay and Tannah having been opened on the 15th April, 1853, the terminus being at a country village, yielding no goods traffic whatever, the revenues from passengers and parcels alone have been at the rate of nearly eight per cent. per annum, on a total outlay of 7,000*l*. per mile; and as the wet season, which enormously reduces all kinds of traffic, occupies half the summer six months, and only one-fourth of the whole year, the gross revenues on the line for the twelvemonths, of which the whole coming portion is favourable to traffic, will probably be found to exceed eleven per cent. on the year. The ordinary estimate for working charges is 50 per cent. on the receipts, and this will leave 5½ per cent. for dividends, at the commencement of the experiment, before any goods traffic can come into existence, and probably not one-fourth of what will by and bye appear, when the line is extended, has made its appearance. Thirteen years elapsed betwixt the time Mr. Vignoles recommended the construction of railways all over India at the Government charge, and that when the Governor-General, taking up the subject in a spirit worthy of himself and of the age, gave the weight of his authority for the immediate commencement of a scheme on which heretofore years had been wasted in correspondence. It has been stated in Parliament that seven years were employed in writing about the Bombay ragment, which was commenced and completed in a single working season, at an expense of 7,000*l*. per mile, when 15,000*l*. were allowed by the consulting engineer of Government. The superintending engineer of Madras still maintains, that at our past rate of progress forty years will be required before we reach the cotton country, and probably two centuries will elapse before England is as well supplied with railways as Austria, Prussia, Belgium, and France already are.

The papers lately published by the most distinguished engineers under Government, show that the construction of canals of irrigation have scarcely ever yielded Government less than 15 per cent. in immediate return—that they have often afforded from 25 to 30 per cent., not unfrequently from 30 to 50 per cent.—and on several occasions hydraulic works have repaid themselves within a year or a year and a half of their construction; and it has been clearly proved, that there yet exist lands capable of profitable irrigation sufficient to increase the revenues of India from 5 to 15,000,000*l*. annually, were the whole money invested in the works to be borrowed at 5 per cent. Col. Cotton estimates that the single work across the Gadavery, costing 50,000*l*., will lmost immediately yield 25,000*l*. a-year, and, when the cultivation of sugar is extended, will probably realise 50,000*l*. a-year; and that had it existed during the last twenty years more than 100,000 lives lost by famine would have been saved by it. There is no principle more generally allowed than this—that Governments should confine themselves, as far as possible, to the administration of the affairs of the country, committing public works to the hands of private enterprise, so often as this can be made available for the object desired to be fulfilled. A joint stock company is now in process of organisation, for the promotion of artificial irrigation in India on the same general principle on which railways have been promoted. To meet the want of confidence of capitalists where investments in India are required, a minimum guarantee will be asked for, and a restriction placed on the dividends, so that profits exceeding say 10 or 20 per cent. shall be made over to Government. The revenues will be looked for solely from water rent, at so much per thousand cubic yards as at present, no interference whatever being made with existing territorial revenue or other public arrangements. In the vast sums just named there seems margin enough of profit both for Government and the copartnery; and the large amount saved by the dispatch insured by private enterprise, exerting itself under the strong stimulants of gain, compared with the delays which always attend all the *peaceful* operations of Government, would in itself be sufficient to fill a capacious treasury. Canals of irrigation go hand in hand with the construction of roads and railways, the latter furnishing the former with the means of transporting to market the increased produce they bring into existence, and which could only by some such means as this be made profitable, the former providing the latter with the traffic they most desire to increase.

When it is considered how recent a thing it is for the Government of this country to pay any heed to the instruction of the people in arts and manufactures, for the development of the industry and resources of the country, it will not be deemed very wonderful that the subject should in India be almost altogether overlooked. When it is seen with what assiduity it has of late years been taken up in England, and what gigantic results it promises to produce where private enterprise is of itself accomplishing so much, and stands comparatively so little in need of assistance, the fruits that may be looked for from it in India, where, in the midst of natural resources of unbounded promise, the slavery to custom is universal, and apathy and ignorance reign supreme, may be guessed at. I am so little acquainted with what has been done at the other Presidencies, and should probably do such inadequate justice to individuals, that I shall chiefly confine my remarks to Bombay, merely noticing the Engineering College at Roorkee, the Museum of Economic Geology at Calcutta, and the Economic Museum and School of Industry at Madras. The oldest of these establishments is that at Calcutta; it was brought into existence about twelve years ago, and placed under the charge of Mr. Piddington, formerly an officer in the Company's Commercial Navy, a man of talent, general accomplishments, and indefatigable industry, of late years celebrated for his researches of the "phenomena of hurricanes and storms." The museum contains specimens of the raw material—animal, vegetable, and mineral—of the manufactures and tools, and implements of manufacture, to be met with in India. I am not aware in what particular manner, or under what regulations, it is made available to the public. The Engineering College at Roorkee was brought into existence under the auspices of the distinguished Governor of the North-west Provinces, the late Mr. Thomason, when that splendid system of canal operations, which, during our wars with Affghanistan and Scinde, had been permitted to languish, was brought into activity by the late and present Governors-General. Forming the head-quarters of the works, and placed nearly at the centre of the principal operations then in progress, the object of the establishment was to provide instruction in all departments of practical and theoretical engineering, and their kindred arts and sciences, to the natives and Europeans likely to be employed in the work, while officers from all parts of India, whose tastes or talents lay that way, were encouraged to resort to Roorkee for instruction.

Full particulars of the establishment and its arrangements have been published by Government, and it seems to be answering to admiration all the ends expected to be fulfilled by it. The Museum and School of Industry at Madras seem to owe their existence to the zeal and ability of an individual officer, Dr. Hunter, of the Madras Medical Establishment, assisted by a brother medical officer of no less distinction—Dr. Balfour, and cordially patronised by Government. Instruction is given at the school in drawing, modelling, copper, wood, and lithographic engraving, in pottery and the plastic arts, sculpture, and carving in wood and stone, and a vast variety of other branches,

Government liberally assisting with European workmen, and permitting their establishments to be laid under contribution for tools and other assistance. The Museum is on the same general plan as that of Calcutta. I am not prepared to enter into details.

In 1844, an establishment was projected at Bombay, under the name of the Polytechnic Institute, having three great objects in view; first, the reformation, training, and maintenance of pauper children and juvenile delinquents taken up by the police—somewhat on the plan of the ragged schools afterwards brought into existence in this country; secondly, the instruction of native workmen in the use of improved tools and implements, and the practice of the arts and manufactures, as known in Europe; and, thirdly, for the establishment of an economic museum, on a plan embracing the general features of the Adelaide Gallery, as it existed in 1840, the School of Design and Museum of Economic Geology, and the Great Exhibition. These things were intended to be worked out by a private co-partnery, Government, in consideration of the reformatory part of the plan, charging itself with the expense of the European supervision and instruction. So desirable and so promising was it considered that native princes and noblemen from all parts of India contributed to its funds, and, long before it was in full operation, workmen from the remote provinces of Rajpootana, Goozerat, and Kotah, in defiance of the apathy and prejudices usually ascribed to them, resorted to it from places many weeks' journey off, and exhibited while they remained—which some of them did more than twelvemonths—the utmost anxiety for instruction and aptitude for improvement. A series of those delays and interruptions known only to India, but which there are of incessant occurrence, here made their appearance, and so wearied and disgusted the original subscribers, that they broke up the co-partnery, and divided the funds, not, however, until the foundation had been laid for the reformatory school, as originally proposed as a fragment of the plan. The establishment, which is maintained by public charity, has been four years under my charge, and is now eminently flourishing. In 1848, the plan of the Economic Museum, to be found in the Transactions of the Bombay Geographical Society for that year, and of the Annals of India for 1849, was laid before Government, and it was stated, that should it be favoured with an expression of cordial approval from them, such as to signify an appreciation of its value, it would be brought into existence and maintained by private contribution, without any demands upon the public purse; the answer received was so frigid and disheartening that the whole was laid aside until more auspicious days should arrive, and I have still in my possession a collection of several thousand specimens awaiting some future time and opportunity for being turned to account. It was proposed to construct a spacious but inexpensive building, capable of indefinite extension and improvement, should circumstances and funds permit; in this were to be arranged specimens of all the raw produce, animal, vegetable, and mineral, of all the manufactures, and of all the tools, implements, and contrivances for conversion from a raw into a manufactured state, which the East supplied; these were to be arranged under a double system of classification, geographical and specific. Under the division, say of China, Bombay, Scinde or Zanzibar, the whole of the productions that any one of these localities supplied were to be arranged, so that any traveller proposing to visit the countries just named, might, by resorting to the museum, familiarize himself with all the products to be looked for there. The articles in the other sub-division were to be arranged in classes, somewhat in the following manner, viz.:—

Pottery Tools and Materials.—Granites, felspars, alkalis, glazing, and colouring materials.

Potters' wheels and other tools, models of kilns, &c., &c.

Specimens of all descriptions of pottery, from all parts of the East.

By this means parties desiring to purchase, or to familiarize themselves with any variety of goods or of manufacture, without relation to the country from whence they came, might do so at once; and persons from one part of India might carry home with them the improvement, and familiarize themselves with the processes found to prevail elsewhere. Native dealers were to be encouraged to bring specimens of everything they sold for exhibition to the museum; the prices, and all that was known regarding each individual article was to be written upon it. In each division a book was to be placed, wherein was to be written all the information already possessed, or which in process of time could be gathered in reference to the locality, the qualities, the value, and the uses of each individual commodity, in the hopes of producing a Dictionary of Arts and Manufactures for the East, such as might remedy the deplorable ignorance from which we at present suffer, in reference to almost everything that most concerns commercial men trading with India. The building was to be surrounded by a park and gardens, planted with exotics or productions of economic value, and filled with models of steam-engines, hydraulic machines, water and wind mills, telescopes, microscopes, and other scientific instruments, the inspection of which would afford amusement, arouse curiosity, and impart information; so promoting the great substantial ends of education amongst a people nine-tenths of whom had no chance of obtaining it by other means. This scheme, though at present in abeyance, has never been lost sight of, and the slightest stimulant from home would, I feel confident, at present speedily bring it into activity. We should then, besides the other more important tasks we should be able to accomplish, be prepared to supply the Society of Arts, or the Museum of Economic Geology, at a moment's notice, with any specimen of Oriental produce, or any information regarding our productions that might be desired; while we should obtain from them in return information as to what was required for the home market, and how we should best proceed to make what we had to dispose of known and acceptable.

When these projects were first brought forward at Bombay, it was not known that plans for Museums, to a considerable extent similar to that described, though less ambitious in their aspirations, unless perfect and systematic in their arrangements, had been under the consideration of the Royal Asiatic Society of London, and had been strongly recommended for establishment in all the districts to the Madras Government by General Cullen, resident at Travendrum; and I entertain no doubt that both Schools of Industry and Museums may be brought into existence, without material charge on the public purse, and with inconceivable advantage to the community, were Government to take the matter in hand.

In March, 1853, Sir Jimsetjee Jhejheboy proposed to Government to make over to them a sum of £10,000 for the endowment of a School of Industry, to instruct natives in the higher departments of arts and manufactures, on the condition that Government should bring the establishment into existence, and provide for its superintendence; and I have strongly recommended that this be made the means of restoring the Polytechnic Institute to its integrity as originally intended, the whole divisions of the establishment being placed under one common head, the salary being kept conterminus to each other. The matter was still under consideration, and will remain such, until Sir Jimsetjee Jhejheboy, now betwixt 70 and 80 years of age, is gathered to his fathers, and his grant becomes beyond the reach of Government.

As a single illustration of ten thousand that may be offered, the present state of the paper market may be taken. Within the past few months the price of paper has risen one halfpenny per pound, and this, it is said, will occasion for the *Times* newspaper alone a loss of 10 or £12,000 per year. As there appear to be upwards of 150,000,000 lbs. of paper consumed annually in the British Empire, the increase of price, small as it appears, will amount to

upwards of 312,500*l*. It is said to arise solely from the scarcity of rags, the raiment wearing not providing exuviæ rapidly enough for the supply of printing material to provide intellectual food for the reading portion of the population. In India we have short staple flax, and cotton to any amount, almost worthless for the purposes of ordinary manufacture, but perfectly fitted for the paper market. We have cheap, neat-handed, and ingenious workmen, abundance of pure water, smokeless skies, and sunshine of unsurpassable brightness; the means, in short, of providing the world with unlimited supplies of paper, if we were only taught how to make it. The coir mat manufacture, as far as Europe is concerned, has already passed away from us, but we have the markets of India, Australia, and America still open to us.

DISCUSSION.

The CHAIRMAN observed, that although they all understood the subject, and, looking at the vast resources of India, must feel proud that so small a territory as England should hold sway over so amazing an extent of country as the Indian empire presented, still they could not but regret that they had not better fulfilled their mission as governors of that dependency. With the enormous revenues of India, it was almost incredible that she should have only 22 miles of railway constructed, while in the United States, where there were no such facilities, there were 12,000 miles of railway open. What advantages would not accrue to us if we had only a tithe of that railway communication, and consequent economical transit in India. We could send iron to India as cheaply as we could send it to America, and with the forests of India there was no reason why iron should not be made there. But even if they could not make it there, we could supply them with an unlimited quantity; and, notwithstanding this, year after year passed away, and at the end of 16 years there were only 22 miles of railway open in India. It was said, as an argument against their construction, that the natives would not travel on them; but so far from this being the case, experience proved that the natives availed themselves largely of the only railway there, and that, short as it was, it paid a dividend of 5½ per cent. They were now also proceeding to lay down telegraphs, but this might have been done many years ago. He feared there was a long catalogue of misdeeds against the government of India, and the Society could not do better than bring the subject before the public, and by discussion endeavour to show not only that much might have been done, but that much still remained to be done.

Mr. MACLACHLAN said that he had been one of the first who had laboured to improve the present means of transit, and to do what lay in his power for the welfare of his fellow-countrymen in Bengal. In the year 1842, the subject of the want of proper means of transit had come under his notice. He then proposed to open up a line of road 1,100 miles long. When he first broached the subject, he was regarded as a lunatic, and as a man who spoke of being able to accomplish impossibilities; but with an expenditure not greater than 10,000*l*. he had succeeded, within six months, in reducing the time occupied in travelling a certain distance from twenty-nine days to six days. This undertaking was called "The Inland Transit Company of Bengal," and employed 600 horses. It was now in active operation, and through its instrumentality a means of transport had been opened to Delhi, diverging to the seat of Government at Agra. It was a matter of deep reflection to him, looking at the vastness of India, her noble rivers, that proceed down to the sea, and her immense producing powers, that means were not taken, by cutting canals, to double her produce and to cheapen it, not only for our people but for those of other countries. The means of effecting this object were in the hands of the Government, who had only to give their sign manual to have it carried out. The money of the Government was not wanted, all that was wanted was their security, and if they would issue paper money, or promissory notes, similar to the 50 millions' worth in circulation at the present moment in this country, ten millions of money could be raised within a few months to carry out great public works. But this sum was not necessary. If only 1½ millions of money could be had, it would be sufficient to make a canal from Calcutta to Benares, and thus open up the district of Upper Bengal. There were many important cities along the Ganges, including Patna, Benares, Cawnpore, Juttighan, and others, which contained a population of 60,000,000. In fact, all the wealth of the country lay along the rivers, for as there were no roads it was impossible to have cities in the interior of the country. On the line of country which he had opened up he found only wild beasts and untutored savages. In many cases he had travelled for 180 miles without seeing a single village, the government post being carried on relays of horses. India was possessed of immense wealth, and the balance of trade was still in its favour notwithstanding the heavy annuities and subsidies which she had to pay. We had been in communication with India for upwards of two centuries, but all the wealth of the people was locked up among themselves, because they had no confidence in us, and had no means of communicating with us. Although we governed the natives of India they were still much separated from us in feeling and sympathy.

Mr. FRITH expressed his regret that Dr. Buist was not in the room, as no one could have entered into a discussion of this sort with greater ability. With regard to railways, he (Mr. Frith) was one of the originators of the Bombay line, and he could state that Dr. Buist's remarks were born out by the facts of the case. He was not, however, inclined to attach too much blame to the Indian Government, for they had obstacles to deal with from the nature and habits of the people, which it was extremely difficult to surmount. The physical condition of the country on the Bombay side of India was opposed to the construction of railways, but he believed that in the course of the next half-century we would see railways in the cotton districts. In Bengal the land was low and level, and greater progress might be made. He considered the chief resources of India to be her population and the patient endurance of the natives, combined with their willingness to work for a very small stipend.

Mr. G. F. WILSON observed that in consequence of the difficulty of transit, the valuable oils and greases to be found in Central India, and which would find a ready market here, could not be brought to this country.

Mr. TWINING inquired how far the agricultural resources of India could supply this country, in case we were shut out from the trade of the Black Sea and the Baltic.

Mr. MACLACHLAN said that at present any prospect of a supply from India was quite out of the question, as the failure of the crops at Madras and Bengal had been so general that corn was at famine prices at Delhi. If, however, capital were introduced into the country, he saw no reason why it should not supply the world, as it was as fertile as the valley of the Rhine.

Mr. C. WENTWORTH DILKE inquired of Mr. Frith to what extent "broach," or soft corn, could be procured from India. Having seen some of it, in the year 1851, he had inquired of Messrs. Forbes, Forbes, and Co., and they had informed him that a very large quantity could be introduced into this country. Freights were then only 3*l*. 10*s*. per ton, which would have left a fair margin of profit at 12*l*. 10*s*. per ton. He presumed that this description of corn could be brought to this country, if carefully cleaned so as not to deteriorate on the voyage.

Mr. FRITH could not say in what quantities the particular grain alluded to by Mr. Dilke could be procured, but the corn-growing capabilities of India were immense. He apprehended, however, that corn from the Cape of Good Hope and South America would successfully compete in this market with the produce of India.

Mr. LOWE said, that with respect to cotton cultivation

in India, it had been proved that the capabilities of that country for producing cotton were quite equal in that respect to those of America, while the cost of production would be much less.

Mr. Dilke called attention to the efforts which were made in the United States to open up means of communication, and mentioned that in the State of Pennsylvania there were three lines of transit across the Alleghany mountains, one made by the government and two by private enterprize. These lines of communication were partly by canal and partly by railway; the three lines of railway being in some places not more than 150 yards apart, and all had sufficient traffic to make them pay. The canals terminated at the base of the mountains. The boats used on the canals were of a peculiar construction; they were made in four or five parts, so that they could be taken to pieces, and each separate portion was run upon a truck for convenience of transport by railway. When travelling on one of these railways during the past summer, he had passed, on his journey down the mountain, as many as six or seven boats. The two or three horses used for "tracking" on the canal were conveyed in the front compartment of the boat.

The Chairman said that the discussion tended to establish the fact, and make it more apparent, that there was a lamentable want of transit in India, and that, if care had been taken by the Government to construct adequate public works, the resources of that magnificent country might have been developed to a wonderful extent. He hoped that, as the constitution of that body was altered, and that as the Board of Direction was fewer in number, but greater in strength, the results for the future would be very different.

A vote of thanks was then passed to Dr. Buist for his paper.

The Secretary announced that on Wednesday next a paper would be read "On the Importance of a correct System of Agricultural Statistics," by Mr. Leone Levi, on which occasion he would be presented with the Swiney Goblet, awarded to him for his work "On the Commercial Law of the World."

COLLECTION OF PHOTOGRAPHS.

This collection having now nearly completed its first route, it becomes necessary to make known the arrangements which have been entered into for complying with the requests of the other Institutions, whose applications have been received subsequent to that route being made out. But before doing this it may be interesting to state what has been the success of the collection hitherto, as far as that is known. The first town to which the collection was sent was Woburn, where it formed part of a general exhibition held under the auspices of the Literary and Scientific Institution. This exhibition remained open three weeks, and the clear profit arising from it was £97 4s. 10d. After visiting Wellingborough, Welshpool, and Whitchurch, it reached Stirling. Here the honorary secretary to the School of Arts, Mr. Rae, took advantage of the collection to illustrate a lecture "On Photography, or the Production of Pictures through the Agency of Light." The Aberdeen Mechanics' Institution grouped round it a collection of photographic pictures by Scotch artists exclusively, sent in in competition for some prizes offered by the Institution: and the Tyldersley Mechanics' Institution incorporated with it some illustrations of educational apparatus, diagrams, &c., for a Christmas soirée. One Institution failed to forward the collection at the proper time, disappointing the next Institution on the list, and another Institution declined to receive the collection as its time approached, owing to the distance between some of the towns to be visited, and the necessarily increased cost of carriage.

The very numerous applications now to be dealt with has rendered it necessary for the Society to procure a second set, so as to reduce as far as possible the time that must elapse before each Institution can receive the loan. Each collection numbers about 100 specimens, averaging 18 inches square each, and will be accompanied by a camera. It is particularly requested that Institutions will take every care of the collections when in their possession, and that they may be properly packed and despatched to the next Institution on the list at the times indicated.

First Set.

*Deptford, Institution	from April 17	to April 25
*Basingstoke, Mechanics' Institution	„ April 28	„ May 9
*Greenwich, Society for the Acquisition and Diffusion of Useful Knowledge	„ May 12	„ May 20
*Uxbridge, Literary and Mutual Improvement Society	„ May 23	„ May 31
*Guilford, Institute	„ June 3	„ June 11
Alton, Mechanics' Institution	„ June 14	„ June 22
*Newbury, Literary Institution	„ June 25	„ July 3
*Salisbury, Literary and Scientific Institution	„ July 6	„ July 14
*Shaftesbury, Literary Institution	„ July 17	„ July 25
*Yeovil, Mutual Improvement Society	„ July 28	„ Aug. 5
*Exeter, Literary Society	„ Aug. 8	„ Aug. 16
*Poole, Town and County Library and Literary Institute	„ Aug. 19	„ Aug. 27
*Brighton, Mechanics' Institution	„ Aug. 30	„ Sept. 7
*Lewes, Mechanics' Institution	„ Sept. 10	„ Sept. 18
*Battle, Mechanics' Institution	„ Sept. 21	„ Sept. 29
Tunbridge Wells, Useful Knowledge Institution	„ Oct. 2	„ Oct. 10
*Tunbridge, Society of Literary and Scientific Enquirers	„ Oct. 13	„ Oct. 21
*Margate, Literary and Scientific Institution	„ Oct. 24	„ Nov. 1

Second Set.

*Bury St. Edmunds, Mechanics', Literary and Scientific Institution	from April 17	to April 25
*Great Yarmouth, and South Town, Young Man's Institute, and Great Yarmouth, Parochial Library and Museum	„ April 28	„ May 9
Wisbech, Mechanics' Institute	„ May 12	„ May 20
*Warwick, Athenæum	„ May 23	„ May 31
*Leamington, Royal Literary and Scientific Institution	„ June 3	„ June 11
Wrexham, Literary Institute	„ June 14	„ June 22
*Shelton (Near Newcastle-under-Lyne), Potteries Mechanics' Institution	„ June 25	„ July 3
*Wirksworth, Mechanics' Institution	„ July 6	„ July 14
Bakewell, and High Peak, Institute	„ July 17	„ July 25
Sheffield, People's College	„ July 28	„ Aug. 5
*Barnsley, Mechanics' Institute and Literary Society	„ Aug. 8	„ Aug. 16
*Burnley, Mechanics' Institution	„ Aug. 19	„ Aug. 27
*Preston, Institution for the Diffusion of Knowledge	„ Aug. 30	„ Sept. 7
Morpeth, Mechanical and Scientific Institution	„ Sept. 10	„ Sept. 18
Falkirk, School of Arts	„ Sept. 21	„ Sept. 29

The asterisk (*) indicates Institutions which have agreed to the Interchange of Privileges.

PHOTOGRAPHY AND WAR.

It is remarkable to watch the development of any new art, and to notice into what unexpected channels it takes its course. Photography presents us with two very striking examples. At first it appeared as a philosophic toy, progressing from day to day, till at length it has become an instrument in the hands of the many, lending its aid to the every-day purposes of art and civilization. Hitherto its uses have been those of peace, now it appears likely to aid the operations of the warrior. It is understood that the Government are about to attach photographers to the expeditions proceeding to the seat of war, both naval and military. Its importance in these repects is obvious; and when once the authorities have tested its practical value, the results will assuredly exceed all that they expect. It is needless to point out the various practical purposes for which, in a military point of view, it may be made available. A dispatch, illustrated with photographic views, cannot fail to convey far more accurate notions to the mind than a mere written document, however voluminous and graphic its description may be. Headlands, lines of coasts, forts, fortresses, dispositions of fleets, armies, face of country, and military positions, may be instantaneously taken, and, if stereoscopically, with a model-like accuracy which would defy a verbal description to emulate.

The rapid, instantaneous collodion process is the one peculiarly adapted for this service, and gun-cotton, though its explosive qualities have not been found so valuable as originally considered, will now, dissolved in ether, in the form of collodion, still hold an important position in aiding military and naval warfare. It is hoped that the Photographic Society, with whom the Ordnance Office are in communication, will find out parties competent to undertake the duty for the Government.

THE FACTORY SYSTEM IN PRUSSIA.

From the report of Mr. Alexander Redgrave, on the Laws regulating labour in Prussia, it appears he did not confine his observations to that question simply, but took the opportunity of collecting information as to the state of manufactures generally in that kingdom and their progress, as well as the condition and habits of the employed. The vast increase in the amount of corn raised and iron consumed in the country are pointed out as an unfailing evidence of rapid progress. A table is given showing an increase within the last twelve years of cotton looms 57 per cent., of woollen looms 41 per cent., of linen looms 14 per cent., of silk looms 70 per cent. on the aggregate, an increase of 26 per cent. It is worthy of remark that 5,018 power looms have been introduced since 1837, and that power had been applied to looms for weaving flax in the year 1849, an experiment which has only been attempted in Ireland within these few last months. The linen weaving appears, from the number of looms employed, to be the most important of all the textile fabrics; but it is by no means now so extensive as the cotton manufacture; although the number of looms is very large, the proportion constantly employed is small; it was estimated that in 1837 the whole of the linen manufactured in Prussia would require the constant employment of only 56,401 looms, while the table given in the report shews 322,480 looms occasionally engaged in that branch. A comparative statement of the imports and exports of raw cotton, cotton yarn, wool, woollen yarn, woollen goods, flax, &c., in the year 1837 and 1851, is given as affording evidence of the manufacturing progress of the country. Of the imports of raw cotton 84 per cent. was retained for home consumption; of cotton yarn 94 per cent. Wool and flax are largely produced, and are exported as raw materials, but of the woollen yarn imported 87 per cent., and of flax yarn 71 per cent., was retained for supplying the manufacturers of the country. The increased facilities of locomotion promoted by the Government of Prussia have been very remarkable within the last thirty years. Good macadamized roads have been laid down where required, canals extended, and in 1840 the first railroad was opened; the number of railways constructed and in operation up to the end of 1852 was thirty-four principal lines and branches, in length 442 German or 2,025 English miles, of which three-fourths were laid down in single rails; in addition to the above 49¼ German, 227 English miles, are now in course of construction. The Savings Bank system is noticed as affording one of the criterions of the frugality and provident habits of the people. The Prussian system of centralization has insensibly tended to encourage a dependence upon the Government, and to supersede that self-reliance and independence which are the characteristic of this country. Within the last thirty-five years, however, savings banks have been established, and institutions in the nature of friendly societies for providing against periods of sickness, &c., and associations for purchasing in the winter time fuel and food in bulk, subscribed for during the summer by small weekly payments. The first savings bank was established at Berlin in the year 1818; the example was followed generally in the other provinces, and in the year 1840 seventy-nine savings banks were in operation; from that time to the end of the year 1849, 132 new banks were established, in all 211 savings banks, in addition to which there were thirty-eight branch banks attached to the principal institutions. The establishment of so many within the last nine years is a strong proof of the increasing economical and provident habits of the people, which are further exemplified by a return, showing the sums deposited, the number of depositors and the proportionate amount of the deposits, contrasted in the different provinces, arranged in the order of the density of their population, which also accords very nearly with the comparison of the higher amount of the deposits in the several provinces.

It appears that there is a savings bank to every 78,471 persons; on an average 1,240 depositors to each bank; that the average sum standing to the credit of each depositor is 63 thalers 8 silber groschen, representing 9*l*. 9s. 9d. of English money, while the total amount, divided amongst the population, would show a deposit of one thaler (3s.) per head.

The statistics of savings banks in Great Britain and Ireland show for every savings bank in Great Britain and Ireland, 48,214 persons; 2024 depositors to every bank; the average sum standing to the credit of each depositor was 25*l*. 19s. 7d., and the amount of the investments, divided amongst the population, would give 1*l*. 1s. 10d. per head.

In making a comparison between the two countries the Friendly Societies in England and Wales must not be forgotten. It is stated from returns made, that the whole number of known societies amounts to 15,953, at a moderate computation comprising a million of members, subscribing a million of pounds annually.

At the time of Mr. Redgrave's visit, "the dearness of the prime articles of consumption was being felt. Black bread, instead of being one halfpenny per lb., was then sold at one penny per lb.; rye meal at rather more than one penny per lb. Meat was proportionally dear; varying from 8d. to 4d. per lb.; but of this the operatives do not generally partake above twice or thrice a week, the frequency and quantity of animal food, as a part of their meals, depending in a great measure upon their improvident or their economical habits. The animal food generally consumed is pork. Potatoes cost from 2s. to 2s 3d. per scheffel, rather more than a bushel and a half; butter, from 6d. to 7d. per lb.; milk, 1d. per quart. Bread and potatoes form the principal support of the operatives, and any enhancement in the price of these necessaries of life inflicts upon them a corresponding amount of suffering; and he was informed that there was much deprivation amongst the factory operatives. The wages of the adult are seldom less than 6s. per week, of young persons under 16 years of age, than 2s. per week; but the adult hand loom weaver in Elberfeld can and does

earn much more than 6s. per week; his earnings depend upon his own assiduity and the description of fabric upon which he is employed; he may earn, at times, twice that sum, and occasionally much more, but then his labour and application must be unremitting. In the power loom weaving factory, at Elberfeld, the wages of the weavers, all young women, were 6s. per week for twelve hours per day. The wages of artizans and mechanics are at a higher rate, being the remuneration of intelligence and skill, as well as manual labour. Considering the rate of wages paid in Prussia, compared with the price of provisions and clothing, and the expense of house rent, it would appear that the Prussian operative receives a remuneration sufficient to procure the simple fare and to supply the slender comforts to which he has been accustomed and with which he is contented; and hence that Prussian manufacturers may procure labour at a more moderate rate, comparing the cost of labour with the cost of the raw material to be worked, than in England; but, comparing the amount of work that can be turned off by an English operative, the skill and intelligence with which he performs his work, and his capability of adapting himself readily to mechanical improvements, it was admitted that, with the sole advantages of cheapness of labour, they could not compete with English manufacturers, and they feared the recent restriction of labour in Prussia would affect the power of production; for the Prussian factory operative labours at least ten hours per week more than his English competitor, and if employed at the loom in his own house his labour is not restricted even to those additional hours. But while the Prussian artizan lives upon his coarse fare and works hard, wherein his position is subordinate to that of the English operative, who enjoys many substantial comforts of life and many social advantages, his inferiority is in some degree compensated for by his ever finding near his home, and within his means, a well regulated school for his children, in which instruction of a sound, useful description is imparted by trained and intelligent masters, and what is equally important to him and to society, that opportunity *must be made use of.*

Though Mr. Redgrave observes on the Factory system in Prussia generally, yet from the time at his disposal he was compelled to confine his inquiries, inasmuch as he was by his instructions required more particularly to visit the manufacturing districts of Silesia. He reports at some length on the present condition of the manufactures of that province, and the labourers employed therein, and received much authentic information from Herr Von Minutoli, Regierungs Rath of the district.

"At Liegnitz and Goldberg there is a considerable trade in coarse woollen goods, principally for exportation to America; at the latter town power looms have been introduced, and more are being erected. The manufacturers complained that their immediate neighbours, the Bohemians, being under no restrictions, kept the factories at work during the night, while they did not run for more than twelve hours per day; but at Goldberg, where the water is the moving power, under the plea of making up time lost in dry weather, * * * the mill generally worked during the night by a double set of hands—men, women, and young persons. The wool was nearly all of Silesian growth."

"Hirschberg is a central town for the purchase of linens, surrounded for miles by the cottages of hand spinners, hand loom weavers, and by bleaching grounds." At the "Josephinehütte glass works, situated upon the hills the boundary of Bohemia, * * * a large quantity of Bohemian glass is manufactured for the London market. These works give employment to between 400 and 500 hands; the chief materials for the glass are found in the neighbourhood; the furnaces are situated in the centre of the district, and the hill-sides are studded with the shops and homes of the workmen. Wherever there is a stream of sufficient power to turn the machinery for cutting and engraving the glass it is conducted to one of these work-rooms, in which from five to ten workmen are employed, and drives a small wheel, which gives motion to the internal machinery. There are elementary schools for the children of the workmen, in which drawing is taught, and there is a drawing school on Sunday for those young persons who no longer attend school."

At Erdmansdorf, Schmiedeberg, Landeshut, Waldenburg, and Freiburg, Breslau, and Glatz, there are various factories for flax spinning and weaving and the manufacture of woollen, worsted, and silk goods and pottery. Many of them have been established through the instrumentality of the government. In many instances domestic weavers are employed. One firm employs 8,000 hand-loom weavers. Worsted, yarn, handspun flax are obtained from Leeds and Belfast, being cheaper than any that can be obtained from the native manufactories; at Glatz are a steam cotton and flax spinning factory and a cotton spinning and weaving factory by water power, the only factories in Silesia wherein school-bound children are employed.

No children, and rarely young persons under sixteen, and no females are, employed in the iron works and mines of Breslau.

"Silesia, rich in coal and iron, and containing extensive forests, produces also large quantities of corn, wool, flax, and hemp. Each product formerly gave sufficient and profitable employment to its population, mines were worked, iron was wrought, glass made in the forests; the meadows and bleaching fields received not only native, but Bohemian and Saxon linen; flax was cultivated, and its manufacture was the chief occupation and support of its peasants. Linen formed the chief article of exchange, but the revulsions of trade, affecting all its productions, have withdrawn the demand for the manufactures of flax fabrics more especially to other parts of Prussia and to other countries.

"The linen manufacture of Silesia, seated in a large agricultural district, was essentially and necessarily a part of the agricultural system of the country: the material was sown as seed and reaped as a harvest, was prepared in the fields, and was wrought in the agriculturists' dwelling, being spun at one cottage and the yarn woven into linen at another, was then bleached in the neighbouring meadows, and the manufacture of linen cloth thus became entirely dependent upon and as it were a subsequent process of the previous opperations in the field.

"The production of the cloth, from the first operation to the last, was conducted upon a principle of barter; but little capital was required to commence and to continue the system; none was applied to improve it. That which their fathers had done the children continued to practise. They knew, and sought to know, nothing of the consumer, of improvements occupying the attention of other manufacturers, or the wants of the great marke s; they made for the trader who collected their goods, and by whose intervention the cloth was transported to other parts of the country and exported abroad, and who paid them by the direct exchange of other goods for their productions. Thus these agricultural manufacturers knew and thought not how to make their goods acceptable to the world, and continued to manufacture as they had done; the demand of course lessened, the value of the goods decreased, and the trade gradually fell from them; their markets were no longer frequented by foreign merchants, and their condition has been thus reduced to a state somewhat similar to that of the hand loom weavers in this country upon the introduction of machinery.

"Such a system of farming and manufactures combined was doubtless well adapted to render a simple and unenterprizing population in a large inland country, at a distance from the capital, and possessing but few main roads, contented and happy, but was altogether unfitted to cope with the advance of invention and the increased demand for goods of a different or of a cheaper description; without improvement and the exercise of intelligence it must fail in a competition which is promoted by the ap-

plication of every resource which science and industry can bring to bear. A few facts will prove this, and show the effect of foreign competition upon the linen industry of Silesia very strikingly:—

"The exportation of linen goods from Landeshut amounted

In 1825	- -	to 130,541 schock.
1847	- -	19,012 ,,
1848	- -	7,820 ,,

and in Schmiedeberg the linen manufacture is altogether extinct.

"The value of Silesian linens exported from Hamburg, amounted to

In 1835	- -	5,100,000 mark banco
1848	- -	1,800,000 ,, ,,

"The competition with which the Silesian linens have had to contend is from Ireland; as the manufacture increased there, so the complaints arose from Silesia that their trade was decreasing."

Mr. Redgrave notices the similarity between the state of things and that which at no very distant period existed in England.

"The linen manufacture has existed chiefly along the valley of the Riesengebirge, the range of hills which separates Silesia from the kingdom of Saxony and Austria, and watered in its whole length by numerous streams, forming meadows well adapted for grass bleaching. The centre of the province is traversed by the Oder, navigable from nearly the extremity of the province to its mouth. Thus favoured by nature, the producers of flax and manufacturers of linen long enjoyed the advantages of their simple and inartificial mode of trading. Their inability as small independent proprietors, each trading upon his own account, performing their own particular operations without variation or improvement to meet the competition of other manufacturers of greater energy and intelligence, and the increasing demand for cotton goods, appear to be the main causes of their present depression."

"Flax is still grown by the small proprietors, and is either prepared by them or at preparing factories established by the aid of the Government, for steeping and preparing the flax, where the flax is better prepared than by the ordinary processes of the growers. The flax so prepared is bought by the cottage hand-spinners, who sell the yarn to a "Sammlunger," whose occupation is to travel round the country places to collect the yarn, paying for it sometimes in money, more frequently in goods, prepared flax, &c., who in his turn disposes of it in the smaller towns, where it is sorted in numbers and again delivered out or sold to the cottage weavers. When the cloth is made, if the weaver be employed directly by the trader from whom he received the yarn, he returns the cloth and is paid in money or in goods for his work; or if he has purchased the yarn he delivers the cloth to the "Sammlunger," who repays him part in money, part in yarn or other goods. In effect, this continues to be a system of barter; the unfortunate spinner or weaver rarely receives money, and even when he does the numerous profits which the produce of his labour must satisfy before it reaches the merchant reduce his remuneration to the very lowest amount. I was assured that the earnings of these hand spinners and weavers, employing their families to help them, would not exceed 3s. per week. In summer they seek employment upon the fields, but the greater portion of the year they have nothing more to depend upon than a miserable and fluctuating remuneration; even taking into consideration the value of the money as compared with the paucity of their wants and their easily satisfied necessities, these families are painfully impoverished. Their food is black bread, rye "suppe," or gruel; sometimes potatoes and even potato parings, without salt; meat and beer never; butter and milk occasionally. Their clothing is also of the poorest kind; still there are many who cling to this mode of life. Proprietors of small parcels of land, peasant owners, whose plot is not sufficient for their support under economical cultivation, who are ignorant of tillage, and yet refuse to part with their encumbering possession, or to occupy themselves industriously in handicraft; but lacking physical and intellectual energy, they prefer to retain their land, their habits, and their prejudices against any improvement. The establishment of spinning factories moved by power, has doubtless effected much for the amelioration of both hand spinners and weavers. The hand spinners formerly produced yarn for the hand-looms and for exportation; but now, notwithstanding the increased production of yarn by machinery and a demand also for hand-spun yarn, which can be produced of a finer thread than by machinery, and is therefore best adapted for the weft of certain classes of goods, there is a considerable quantity of yarn imported from Leeds and Belfast, inasmuch as those yarns are brought to Silesia at a cheaper rate than similar goods could be produced in the country. All these spinning factories are employed in the manufacture of yarn for local hand-loom weavers, and it appears that the hand-loom weavers employed by the proprietors of these factories may, by steady work, earn wages double the profits of the independent weaver. They must work regularly, and in many cases in factories provided by the proprietors; yet, in the midst of these regularly paid operatives, the small master weaver, hating control, clings to his poverty and his independence.

"The cottages of these weavers contain, in the general sitting and cooking room, the loom or looms, placed at the window so as to block out the light, a huge stove, a table, and a seat. The stove is heated for cooking; the weavers are at work, and the only ventilation is that which cannot be avoided when the door is opened for ingress or egress. In such a room there can be little comfort, either as a room or as a workshop. The close and vitiated atmosphere is stifling to one unaccustomed to so confined an air, but then there is independence—freedom from certain hours and certain regulations imposed by the employer, forgetful of the chains they fetter upon themselves; for the half-day idled, they must work half the night, burn fuel and light, and even with the most unremitting labour they cannot earn anything like the wages of the factory hand-loom weaver. I speak from facts. I have visited well-ventilated factories (for hand-looms) were the weavers were under proper and necessary regulations only, and I have visited the homes of those who preferred their independence."

The number of linen looms in constant work for the whole of Prussia has increased from 35,877 in 1837, to 48,384 in 1849; the number of linen looms in Silesia at these two periods was, respectively, 12,347 and 15,865. The number of cotton looms for Prussia was, 45,013 in 1837, 70,693 in 1849; the number in Silesia at the same periods, 20,320 and 30,552 respectively.

In the district comprised in the Government circles of Aix-la-Chapelle, Cologne, and Dusseldorf, including, besides those towns, Elberfeld, Barmen, Crefeld, Gladbach, Eupen, Duren, &c., the number of school-bound children, who did not frequent school, varied from 2·28 to 2·90 per cent.; in the whole of Silesia the per centage varied from 2·18 to 4·65.

The proportion of illegitimate to legitimate births, in two of the districts of Silesia; was

At Breslau,	1 illegitimate to	7·26	legitimate births.
Liegnitz,	1 ,,	6.40	,,

—the lowest state of immorality disclosed by the returns; while the manufacturing districts of the Rhine contained the highest proportion of legitimate births:—

At Dusseldorf,	1 illegitimate to	27·47	legitimate births.
Aix-la-Chapelle,	1 ,,	37·63	,,

These latter facts are also gratifying proofs that the Factory system may exist without more danger to the education and morals of young workpeople than may be found amongst a population of varied occupations living in scattered hamlets.

The Government appears to have tried various means to mitigate the distress among the hand-loom weavers, and

the principal efforts at first were directed to the alleviation of the immediate distress, and to prop the declining linen trade by pecuniary assistance to individual tradesmen and mechanics. Assistance of this nature produced no good results; it was too restricted, too shortsighted, and benefited only the starving man so long as it relieved his hunger; it effected no change in his condition but to render him less independent, less active than before; as the Government applied pecuniary aid directly to individuals, so the people expected the Government would continue the charge, without exertion or care on their part. "The Government, therefore, convinced that the linen trade could only be revived and maintained by making goods to suit the demand, and such as should defy competition, commenced the system which has been continued to the present time. They established a school for teaching the best systems of growing and cultivating flax, a model institution for exhibiting the best methods of steeping and preparing it, and as there was a considerable demand for hand-spun yarn, they supported a school for teaching the hand-spinning of flax, whence teachers issued to instruct in local schools; they invited manufacturers from other districts to settle in Silesia, introducing new employments and new habits, and lastly, they promoted, both by undertaking the erection of buildings and by the gift and loan of valuable machinery, the spinning of flax by power as the chief means of enabling the linen manufacturers of Silesia to compete in the markets of the world, and of raising the spinners and the weavers from their forlorn and destitute condition.

"Up to the end of 1849 upwards of 700 persons had passed through the school for the cultivation of flax; steeping and preparing factories had been erected in several districts; and twenty-seven spinning schools were in active operation; ten flax spinning factories had been established, moved by steam power, and fitted with new and improved machinery, containing in the aggregate 44,050 spindles, giving regular employment within their walls to several hundred workpeople, and in the surrounding villages constant occupation to many thousands. These factories have nearly all been established within the last twenty years; in 1837 there were seven flax spinning factories, containing 10,444 spindles, the number of which is now increased above fourfold.

"They have, notwithstanding, been openly and covertly opposed; openly, by the class of middle merchant, small tradesman, and "Sammlunger," who, as I have before stated, exist upon the poverty of the cottage spinners and weavers, and of course endeavour to perpetuate the system most adapted for increasing their profits; and covertly, by that spirit of inactivity and unwillingness to exertion in a new path, which has been the chief original cause of the transfer of the linen trade to other markets. As one of the objections to the factory system, it was gravely urged by its opponents that the yarn spun by power must be inferior to that spun by hand, because in the spinning by hand the thread is moistened by the saliva of the spinner, who must keep his fingers moist to enable him to seize and twist the fibres of flax as he forms the thread, and thus imparts to the thread a firmness and compactness which would be wanting in the yarn spun by the aid of simple water. An objection, like many others, as my informant, an intelligent manager of a spinning factory, observed, alike groundless and improbable, for in the bleaching of the linen, the daily processes of alternate saturation with water and evaporation upon the field and under the sun would leave little of the human moisture supposed to have communicated such strengthening qualities.

"The manufacture of shawls and velvets has been introduced at Schmiedeberg to supply the linen trade; of watches at Lähn; and the art of plaiting straw has been taught to the weavers of the hills.

"In stating some of the principal measures adopted by the Government, it is also no more than just to point out that many of their officers in Silesia have laboured indefatigably in the same direction. At Leignitz, Herr Von Minutoli has gathered a variety of specimens of the industrial arts, more especially as applicable to the wants of the province, and arranged them in a museum, which is open to the student and the workman. Specimens are here to be studied of the results of skill and art upon all the products of the earth: iron work, porcelain, pottery, glass, leather, textile fabrics, &c., and the progress of workmanship and handicraft may be followed out from the rude utensils of the earliest ages to the highest degree of perfection exhibited in the works of the best masters; and such a study is facilitated by there being also specimens of the implements used by them. In one of the circles within the regency of Leignitz, that of Hirschberg, containing sixty villages, the Landrath, Herr Von Graevenitz, has induced the local authorities in twenty-eight villages to establish schools, in the nature of our ragged schools, for the children before they arrive at the age at which they are bound to attend the elementary school of their village. These children, under six years of age, are employed in summer to collect mountain strawberries, helping in the fields, &c., during the rest of the year they have no other occupation but begging; and the establishment of these schools within the last four years has been the means of relieving from immediate want and training to industrious habits about 1000 children annually, who are instructed in reading and in the spinning of flax, and receive one meal per day. It is not intended to restrict the instruction to "spinning," but, as one of the chief occupations of the circle, it was considered best adapted as a commencement.

"But of all these measures, the introduction of spinning by power appears to have been more successful than any of its predecessors, although still far from meeting the whole of the evils. Prejudices have to be broken down, idle habits eradicated, self-dependence inculcated, before the people can recover and retain the position of an industrious self-supporting population.

"It will be apparent, from what I have already stated, that the factory laws of Prussia have been framed with the primary object of securing to factory operatives a sufficient amount of schooling, equal in effect, though perhaps not in quantity, to that to which all children are subjected; and that they act upon an extended system of compulsory education, being directed to secure the maintenance of a long established principle, not to enforce the universal observance of an original obligation; and although a perusal of the laws would lead one to imagine that the regulations are stringent and must bear hard upon the employers of labour, it is nevertheless undeniable that hitherto no difficulty has been felt, whatever difficulties may be anticipated from the law of 1853 in the employment of children in cotton and woollen-spinning factories; the generality of the school obligation and restriction of labour in so many employments places all upon an equality, and the manufacturers of one class of goods cannot withdraw, by the attraction of increased wages and the absence of school attendance, children from a neighbour's factory, where reasonable hours and school attendance are enforced."

Mr. Redgrave, after pointing out that the great demand for the labour of children in this country, and the constant complaints made by schoolmasters that no sooner has a child attained the power of reading and writing than it ceases to attend school, and that his efforts are damped and thwarted by the never-ceasing changes in his school, proceeds to say:—"The law of Prussia requires that no child shall be employed in a factory unless it shall have attended school for three years, or can read and write, and then it is required to combine school attendance with labour. This appears to be sound policy; when a child begins to earn wages, it ceases to be a mere child, it labours as a man, and receives the wages of its labour; this is a position which it covets and prizes; it is frequently in all but strength and size equal to the adult labourer in the same employment; if that child has never

been to school, and is sent there solely because it is employed in a factory, it follows that the instruction to be obtained is a secondary consideration, is acquired carelessly and without heart. But if the same child had been to school, and had learnt to read and to write before admitted to work in a factory, it will not be denied that the benefit of instruction then will in all probability be tenfold, and that the child will receive that instruction more willingly, as it will be evidently not a clog attached to employment. The application of such a principle in this country would have been impossible a few years back, both from the paucity of schools and from the lamentably small number of children frequenting them, but the increased number of schools in operation, and the increasing attendance of children would, probably, render the carrying out of such a system less difficult. The schools to which I have referred are in the midst of other schools and of factories, and yet, notwithstanding the competition for labour, the proprietors do not lack hands; and I venture to hope that a principle requiring some school attendance previous to employment in a factory, or rather that no child should be qualified to work in a factory unless it had previously attended school might be so gradually and judiciously introduced that it should have no injurious effect upon the supply of children necessary for the labour in factories."

Mr. Redgrave then refers "to the iron and coal masters' prize scheme, in South Staffordshire, reported by Mr. Tremenheere, inspector of mines, from whom the scheme originated, and by whose exertions it has been mainly established, and by the Rev. J. P. Norris, who was authorized by the Committee of Privy Council on Education to conduct the examination of the candidates. This is an association for awarding prizes to children attending schools in the mining districts of South Staffordshire. The following are two of the fundamental rules:—

"'Candidates must have been at least two years in attendance at their respective schools.

"'These schools must be under Government inspection.'

"Upon the occasion of the first examination on the 24th February, 1852, eighteen schools, having 3,000 scholars upon their books, contributed eighty-five candidates qualified to compete. Each successful candidate received, in addition to his prize, a certificate testifying to the nature of the prize and the merits of the holder, signed by the president of the association and the Inspector of Schools, and it is stated that these certificates had been afterwards useful as testimonials in obtaining employment."

He alludes "to the impediments to the extension of the better class of schools by the encouragement given by parents to masters who are neither sufficiently instructed nor adapted for the office of schoolmaster. Similar difficulties do not exist in Prussia, where every teacher of youth must be previously examined and certified, under the regulations of the Government, before he can follow his profession."

Though he does not advocate a strictly analogous system for this country, yet he maintains that some control is necessary over teachers. Admitting the right of a parent to select the school, he considers it no infringment of that right, but a proper policy, to prevent his hard-earned money being squandered, not only without benefit to his children, but even to their positive injury.

JOINT-STOCK COMPANIES.—The Registrar of Joint-Stock Companies reports a list of 339 companies provisionally registered in 1853, and 124 completely registered. The list of companies previously registered comprises 35 assurance companies, 80 railway, 54 gas, 33 for other public works, 32 mining companies, 30 companies for conducting manufactories or working patents, 18 shipping companies, 3 land conveyance companies, 4 fishing companies, and 7 trading. Among the companies that proceeded to complete registration were 24 assurance companies, 39 gas, 4 for other public works, 18 mining companies, 10 for conducting manufactures or working patents, 10 shipping companies, and 2 trading.

ON REFORMATORY AND INDUSTRIAL SCHOOLS FOR VAGRANT CHILDREN.

By J. C. BUCKMASTER.

(*Continued from Page* 307.)

The vagrant children, for whose benefit Ragged Schools were established, form a distinct class, and require very different treatment to those children who have always had the advantage of sober and industrious parents. It is scarcely necessary, in illustration of the argument, to adduce any statistics as to the extent of juvenile delinquency in this country. The following statistics, from a Parliamentary Paper, may not be altogether out of place:—In 1849 there were 6489 juvenile offenders committed in England, and in Wales 73; while in 1850 the number committed in England was 6988, and in Wales 82. Of the number in England and Wales, in 1849, 167 were sentenced to transportation, and in 1850 184. The others were sentenced to various terms of imprisonment. On the 1st of November last, of juvenile offenders undergoing sentence, there were in England and Wales 169 under 13 years of age, and 568 under 16. Out of this number 429 had been in prison before. Of the juveniles then undergoing sentence 29 were illegitimate; it appears that of the offenders then in prison, in pursuance of sentence, 329 had lost one parent, and 103 had lost both parents, 327 were unable to read, and 554 had not been brought up to any definite occupation. So far as I have been able to investigate, I can find no nation in Europe presenting anything like the same statistics of juvenile delinquency. Before a boy in this country can become an object of legislative interference, he must become a criminal, and after numerous convictions, at the public expense, he enters upon the life of a convict, at Parkhurst. How many boys might have been saved this degradation; how much public money saved by timely interference.

In England and Wales there are 3,450,000 acres of waste land; some portion of this land is capable of profitable cultivation. Upon 200 acres of this land I would suggest the establishment of an Industrial School, with suitable accommodation for 200 boys; the land should be chiefly cultivated with the spade, and the careful preservation of the manure of such an establishment would in a few years make it very productive. These schools should be open for vagrant children, and no boy should be allowed to leave the school before he was 16 or 17 years of age. If the parents of any boy at these schools could show satisfactorily to the authorities that they were in a condition to take charge of him, such a request might, under proper regulations, be granted, but in no case should it be granted if there was the least probability of the boy becoming a burden on the public. A boy on entering the school should be made to feel and understand that he was about to enter upon a new life,—that his success and happiness depended upon himself. All available influences should be brought to bear upon his character, and every means used to gain his confidence. There is a strong prejudice in this country against the employment of boys who have spent part of their life either in a prison or a workhouse; they are generally looked upon with suspicion; many a good determination has been abandoned, many a noble resolution broken, and many a character lost for the want of a kind word and a promise of forgetfulness of what has passed. I knew a boy who had been in prison for some petty theft, and after his liberation he obtained employment as an errand-boy to a tradesman in the City; he had not been in his situation more than two weeks before he was found out by his old companions, and they wanted him to rob his master; they explained to him how easily it might be effected, and the impossibility of it ever being found out. The boy remained firm to his purpose, and all entreaties on the part of his companions were unavailing; then came the threat, that unless he did rob his master they would go and tell him he had been in prison. True to their purpose, two young men, respectably dressed, waited upon the boy's master, told him they had called

by way of caution, explained the circumstances of the boy's imprisonment, which was followed by the poor fellow's instant dismissal. The poor boy had no father; his mother was a drunkard, and in six months he came to Parkhurst as a convict. I have known parents who have heard the sentence of transportation passed upon their children without the slightest emotion of sorrow. It is this inhumanity of parents which has filled our streets with juvenile mendicants and thieves. Born in vice and matured in crime, many of these poor children are cast like orphans upon the world; an asylum awaits them at Parkhurst, but they must enter through the portals of a prison.

The cultivation of the land is the best employment for these boys, but the chances of obtaining a livelihood as an agricultural labourer in this country are every day becoming more difficult. Their future home and resting-place must be the colonies, and this they should distinctly understand on admission to the school. The choice of a colony might be left to the boy or his parents, and I am not without the hope that such a system as I am about to propose would enable the boys to become valuable colonists. In the case of boys who are deserted, or orphans, I think our duty is clear; but in the case of those boys who have parents, it is more difficult, and I fear the difficulty cannot be overcome without some legislative enactment. An Act of Parliament should empower any householder or policeman to lodge a complaint before the magistrates against the parents of those boys who live as vagrants in the street; these boys are well known to the police, long before they have been known to commit crime. I have sometimes spoken to the police about these boys, and I have generally obtained this answer:—"Ah! I shall have them by-and-bye, sir; I have not been able to lay hold of them yet." Now, this, in my opinion, is just the time somebody should lay hold of them. Should it appear to the magistrate, on inquiry, that the boy had been neglected through the vice or profligacy of his parents, he should order the boy to one of these schools, and the sum of one shilling, two shillings, or half-a-crown, according to circumstances, should be paid by his parents towards his maintenance. I am not insensible to the probable objections that may be raised against a scheme which requires an Act of Parliament to give it effect. Something may be said about the liberty of the subject, and the cruelty of a compulsory system. If parents, by their own vices, become incapable of taking care of their children, there is no cruelty in relieving them of the responsibility—the cruelty consists in allowing their children to remain with them. If parents inflict severe punishment on their children, or send them to work in factories before a certain age, the law interferes, but parents may allow their children to become mendicants and thieves, without any legal responsibility. I have always been averse to Acts of Parliament which interfere with the social duties of life, but I fear these evils cannot be overcome without legislative assistance. I am not disposed to think lightly of those ties which bind families together; I would that these feelings were stronger, but the children that would be most affected by this proposed change are those who, in most cases, would be better without parental influence than with it. Some, perhaps, would be glad to get rid of their children in the manner I have suggested, but the system would hold out no inducement to such parents, because all would be liable to pay according to their means.

The 200 boys which one of these schools would be able to accommodate should be formed into two divisions —the senior division, over thirteen years of age, should work ten hours a day, and the junior division, which would consist of the boys under that age, should work three hours or three hours and a-half a day. These two divisions should be sub-divided into families, of not more than fifteen, and over each family there should be a good agricultural labourer and his wife. The success of the scheme would depend, in a great measure, upon the selection of suitable persons to superintend these families. The clergymen of our agricultural villages would know of labourers admirably suited for these situations. Tailoring and shoemaking should not be brought into the school, except in the case of a few boys, who might, from physical causes, be unsuited for agricultural labour. The school should be made, as far as possible, self-supporting; the most approved systems of agriculture should be practised. It should be continually before the boys, that by their labour they assisted towards the expenses of their maintenance; that the clothes they wore and the food they eat were partly produced by their own work. If it were convenient, the boys should be paid a small sum weekly for their labour, which should be paid back again for their board. This would remove the idea of pauperism, and create proper feelings of industrial independence. If any surplus money should arise, either from the labour of the boys, or the payment of parents, it should go towards defraying their emigration expenses. During the busy seasons of the year, neighbouring farmers, under suitable regulations, might engage the labour of these boys. The expense of providing food for two hundred boys and fifteen labourers and their wives, would not average more than 3½d. each per day. Each family would take its meals separately in a room connected with the labourer's cottage; a small library might be attached to each family. In the evening the labourer and his wife should sit with the boys, and give them instruction in knitting, plaiting, &c.; work of this kind should be quite voluntary, and any profit that might arise from it should be given to the boy; he should be encouraged to put this money in a bank, which should be connected with the school. The annual expense of maintaining such a school as I have proposed would be about 2,500*l*.

Annual expense of clothing 200 boys	£312
Do. board for boys, with labourers and their wives	1277
Salary of Governor	150
Do. of Schoolmaster	100
Do. of Steward	90
Wages of 15 labourers, at 5s. per week	195
Interest on £8,000, for buildings, at 4 per cent.	320
Interest on £2,000 outlay for stock, and deficiency of produce of land before brought into cultivation	80
Repairs and insurance	50
Total	£2574
Returns on 200 acres of land, at 5 per cent.	£1000
By profit on stock, on a farm of 200 acres	150
Probable payment for boys	650
	£1800

This would leave a deficiency of £774, which might be made up partly by voluntary contributions, and partly by a grant from Government. I believe, under good management, such a school as I have suggested would in a few years be self-supporting.

The Quatt Farm School, belonging to the Bridgnorth Union, affords a good illustration of what can be done by spade husbandry. Last year, upon 25 acres of land, there was a net profit of £50.

(*To be continued.*)

AMERICAN PATENTS.

The Report of the Commissioner of Patents, the Hon. Charles Mason, for the year 1853, states that the receipts of the Patent Office for that year amounted to 121,527 dollars, while the expenses were 132,870 dollars. Among the items of expenditure were 7,086 dollars for seeds and agricultural statistics; 29,513 dollars for salaries, offices, &c., and 23,466 dollars refunded money for withdrawals.

During the year, 375 patents have expired, and 958 have been issued. This is nearly twice the number issued in 1841, though 62 less than last year, and 118 less than

in 1849. The number of applications, however, was never higher than last year. The ratio of patents granted to the number of applications is as one to three: in 1849, when so many were issued, the ratio was as one to two. The cause of this falling off, however, was solely the lack of examiners, caused by the changes occurring in the office in the beginning of the year. That the examiners are not men of much leisure is evident from the fact that there are now 25,000 models in the office, 17,000 of which were received during the past nine years, and 3,000 were filed during 1853. The eight additional clerks who came on in July have enabled them to reduce the 1,028 cases undisposed of on the 1st of July, to 582 on last New Year's Day. And yet more help is wanted. There ought to be force enough not only to reduce these arrears, but to put the office in good working order, so that as little detention as possible may occur when a patent is applied for.

A thing needing very much to be done, as it would greatly facilitate future examinations is, to index carefully and fully the reference books of the office, now amounting to 5,750 volumes. But an increase of force would make more room necessary, and for this the Commissioner petitions. Now a model has to be exposed a long time where a shrewd stranger who has access to the examiners may guess out its features from the glimpses he easily gets. It ought certainly to be so arranged that perfect secrecy could be preserved for a model until the application has been acted on. The commissioner wants to get possession of the large hall where the curiosities from the Exploring Expeditions are now stowed, and for which the Smithsonian Institution is thought to be the proper place. It is needed for the proper exhibition and working of models. He suggests that it would save a great deal of unnecessary trouble, too, if the whole system of withdrawals were abolished, and inventors were required to pay their money only when it is wanted. *Also, that the fee required of foreigners is enormous*, and higher than American citizens have to pay in any country. Great Britain has reduced her high rate of patent fees lately, and charges the same fee to subject or alien. In the States a British subject is charged 500 dollars for that which an American citizen gets for 30 dollars. The proper way would be to charge the inventor, wherever he comes from, *only such a fee as remunerates for the trouble he gives the office* Several other reforms are proposed, which seem reasonable: a change in the manner of taking testimony; of appealing from the decisions of the office; and some measures looking to the prevention of the protracted controversies which come in to absorb a great portion of the value of every truly valuable patent.

THE PLANTAIN TREE.

Paper has been made of the leaves and stalk of the Plantain Tree, which is grown in the West Indian Colonies, for the fruit. Humboldt states that one acre of good land in the tropics, planted therewith, will yield as much nutritious food as 144 acres of wheat. Mr. A. D. G. Netscher, an extensive proprietor in British Guiana, states that the cost of keeping up a plantain estate in that colony would be about 6*l*. per acre; and that if grown, and cut down every eight months for the stem *alone*, the produce would be 1,400 to 1,500 good stems every cutting, or 4,500 in two years, and that the average quantity of fibre of each stem may be taken at 4 lbs. An acre of land will thus produce 9,000 lbs. of fibre per annum, at the cost of 6*l*., and if 4*l*. be added to the expense of drying, carrying and preparing for market, the cost need not exceed a farthing a pound.

If the plantain trees are cultivated for food and allowed to stand in the ground until the fruit is sufficiently full to gather, they must have more space and time, and then the quantity of fibre will not be so large. If 300 trees be allowed to stand on an acre, the first year will give 300 bunches and 300 stalks. The next year 900. The 300 bunches of fruit will be worth, at least, 12*l*. sterling; the 300 stalks will each give 4 lbs. fibre, worth say 1d. per pound (when merely dried and packed),—that will be 5*l*. But there will be raised on the same acre of land, along with the first crop of plantains, a crop of beans, of yams, and of corn, worth together, at the very least, 25*l*.; so that the first year's produce will yield 42*l*., and the second and succeeding years, when the plantains will cover and therefore shade the ground, and there will be no room for other crops, the produce will be repeated every three months, and the fruit will be worth, at the same rate, 36*l*., and the fibre 15*l*. If a whole family is employed planting two acres of land, it may be kept in perfect order by the wife and children, leaving the man at liberty, after the first planting, either to extend the cultivation, to plant and cultivate canes, or to work for hire on a neighbouring plantation.

According to the evidence of Sir Henry Barkly, before the House of Commons, the continuous labour of one able hand, for a year, is necessary to produce four hogsheads of sugar, or 100 hands 400 hogsheads. According to Bessemer's method of manufacture, nearly the whole of the saccharine matter being extracted from the canes, and converted in two days into fine dry chrystals of sugar, the same labour would produce, at least, six hogsheads of sugar, and this would be worth 100*l*.; less 12*l*. for manufacture, 88*l*.

It thus appears that every industrious family in the tropics may, if they can obtain four or five acres of good land, by temperate labour upon it, earn 130*l*. to 140*l*. a-year. Cotton is not so certain a crop, but, as provisions may be grown with it, would be found very profitable. Each family possessed of five acres of good land might, in addition to an abundance of food and fruit, raise three bales of Sea Island Cotton every year, which would be worth 80*l*.; less charges packing and freight, say 10*l*. If the land were thorough drained, and, consequently, ploughed for them, they might with ease produce double the quantity.

Home Correspondence.

WOMEN AND GIRLS *versus* FEMALES.

Sir,—Mr. Wallis's explanation of his use of the term "female," as applied to human beings, does not help the philosophy of the matter much. The word "female" applies generally to all the animal, and probably all the vegetable races, but even on this showing, in order to be definite, Mr. Wallis should specify what he means,—as a female monkey—or, in the phraseology of the police courts, "This here female woman, please your worship." God created man and woman in his own image, and they begat sons and daughters, whom we call boys and girls while in their nonage; of the lower animals, "male and female created he them." If this be so, the descendants of the Massachusetts Puritans, ruling over cotton, do scriptural wrong in mixing them up under the same designation. I am quite aware of the absurd mock-delicacy in the use of words pervading the American union, but this ought not to blind Mr. Wallis to any real indelicacy, and I apprehend it is indelicacy to regard women merely sexually, and therefore it is indelicate to use a term only distinguishing sex. The terms used to denote human beings are numerous—men, women, young man, young woman, boy, girl, lad, lass, wench, queen, quean, king, youth, maiden, gentleman, lady. None of these terms are applied to the lower animals, and surely they are numerous enough without encroaching on sexual designations. The Red Indian says "my squaw," meaning his wife-slave; the labourer says "my woman,"—if coarse, "my old woman," if affectionate. The delicate, manly man says, "my wife," the affected man says, "my lady;" and the term "lady" is especially affected by those who have forfeited some claim to the world's respect, and also by those seeking to rise a grade, as lieutenants are called captains,

and captains majors. Were the duties to accompany the title in all cases, perhaps they would not be assumed. The lady, *laf-dag*, literally loaf-distributor, was the wedded wife of the bread-winner, her husband, and superintendent of the pantler. or bread-chipper or slicer. The young lady, therefore, is really analogous to a baker's assistant; but it is probable that the "Lowell young ladies" rather assist the baker by consuming than by distributing his bread, and would most likely prefer laying down their assumed title if it could only be maintained by giving away gratuitous breakfasts.

But there is something much pleasanter in the idea of an American factory, where "young ladies" save money from ample earnings, and are intelligent enough to write, edit, and publish works of imagination and fancy, than of the factories of our northern towns, where pinched wages and coarseness are the lot of the women working therein. The term wench, commonly applied by a northern father to his daughter, would, in the States, sound indelicate, just as the term "gentleman," applied by workmen to each other, seems absurd to those "born with silver spoons;" who again would feel indignant at being termed "man." The term mistress was originally a term of respect; in some cases it is now a term of reproach.. The term master, denoted ownership or a mastery over arts or trades; it has now degenerated into mister. Esquires have multiplied beyond limit, but shields have disappeared save on seals; workmen have dwindled into "hands," and manhood and womanhood have sunk into mere distinctions of sex, not regarding qualities. Not for this, but far otherwise, did "God create man in his own image."

Society must learn to respect humanity generally in order to teach individuals self-respect. The use and abuse of terms is an important element for this object.

I am, Sir, yours faithfully,

W. BRIDGES ADAMS.

1, Adam-street, Adelphi,
March 20, 1854.

NATURE PRINTING.

SIR,—I wish to claim a small space in the Journal of the Society for a few notes upon that beautiful process termed "Natural Printing,"—to step in between the promoters at present contending with one another as to the priority of ascent up the ladder of invention, Dr. Branson, of Sheffield, contending for one order of things, and Mr. Aitken, of Birmingham, for another; the latter gentleman stating in his paper, read Feb. 15, "that it is his suspicion that the Austrian application had been derived from the English patent for the ornamenting of metals by pressure, and that the earliest application of the principle in which metal was used by the Austrians, in order to copy *lace*, appears to have taken place between May and October, 1852, the first English patent alluded to having been sealed in January of the same year." Now, the purport of my note is to go much further back. I believe the officers of the Imperial Press at Vienna obtained the process adopted so successfully by them between May and October, in the memorable year 1851, from our Great Exhibition, where my friend, Mr. Taylor, of Nottingham, exhibited specimens of lace, muslin, and leaves, printed from impressions in type metal. He has used the plan for the last ten years. A specimen of beautiful lace printing by this gentleman may be seen in the *Journal of Design* for November, 1851.

Believing Nature Printing and the Austrians are greatly indebted to our International Exhibition,

I remain Sir, ever yours truly,

JOHN LEIGHTON.

THE TOTAL NUMBER OF PERSONS EMPLOYED ON RAILWAYS—(open and not open) at the end of June, 1852, was 103,536, and at the end of the same month last year 118,173. The length of line opened at the end of June, 1852, was 7,075 miles and 52½ chains, and at the end of June last 7,511 miles and 75¼ chains. The total length of line authorised at the end of June last was 11,884 miles and 46 chains.

Proceedings of Institutions.

BOSTON.—The Annual General Meeting of the members of the Athenæum took place on the 18th ultimo. The report read by the secretary (Mr. J. W. Bontoft) shows an increase in the members over last year—the number at the present time being 450. The establishment of the class of "annual" or *guinea* members, had exceeded the expectations of its promoters, as many as 13 gentlemen having joined that class within 12 months of its formation. During the past year £11 4s. 6d., was voluntarily subscribed for the purchase of 50 new books; and 10 were presented. The total number of volumes now in the library is 1920. The total revenue for the year amounted to £206 0s. 11d., the expenditure to £195 2s. 10d., leaving a balance of £10 18s. 1d. to the credit of the Institution. The issues of periodicals and newspapers amounted to 4260; of books in the library to 4556; and of books hired from Mudie's library to 7328; making a total of 16,144 issues; an average of 51½ per day. The lectures of the past season had been better attended than of late years. The services of Mr. Partington have been engaged for a course in April, and the Institution is guaranteed against any loss, a sufficient number of tickets for the lectures having been disposed of before the lecturer was engaged. This principle might doubtless be advantageously applied by other Institutions. The report states that the connexion with the Society of Arts continues, and with the most satisfactory result.

BURY ST. EDMUNDS.—On Tuesday, the 21st of February, the members of the Athenæum and Suffolk Institute of Archæology and Natural History held a Literary and Artistic Conversazione in the Town Hall. Upon the walls were hung paintings, drawings, and engravings, and other specimens of the fine arts, the whole of which had been selected from the collections of gentlemen resident in the town and neighbourhood, and were kindly lent for the occasion. Among the most liberal of the contributors to the exhibition were the Marquis of Bristol and Hy. Jas. Oakes, Esq., of Newton Court. The chair was taken at 8 o'clock, by J. H. P. Oakes, Esq., M.P., who commenced the proceedings of the evening by briefly naming the papers which would be read, and announcing that fifteen minutes would be allowed between each, for the purpose of inspecting the artistic attractions adorning the walls. The Right Hon. and Rev. Lord Arthur Hervey, the President of the Institution, then read a most ingenious and eloquent paper upon Poetry and Painting. His Lordship, in a popular style, traced the progress of the imitative and creative faculties in the minds of the poet and painter, from their earliest dawn to their full development in the epic poem and the historical painting, illustrating his remarks by references to the pictures on the walls, and by apt quotations from Homer, Milton, &c. He then showed the analogy existing between the different schools of painting and poetry. After the lapse of the appointed time, during which the audience had promenaded round the Hall, the Right Hon. and Rev. Lord Chas. Hervey, M.A., proceeded to give a short lecture upon the Island of Malta, illustrated by drawings, maps, and plans. His Lordship first briefly, but most lucidly related the manner in which the island became a British possession; he then described its geographical position, its general appearance, and its impregnable fortresses, and impressively shewed its importance to England as a station in the Mediterranean. Adverting then to its early history, he demonstrated by drawings and plans, made by himself on the spot, the identical bay in which St. Paul was shipwrecked, and confirmed his assertions by citing local names and traditions. His Lordship concluded this most interesting essay by describing a Roman tomb in the island, which he had opened and examined, and by exhibiting amphoræ, urns, &c., he had taken from it. The third and last paper was on the Language and Literature of Ancient Britain,

by the Rev. Rt. Jones. The proceedings of the evening were terminated by a short address from the chairman, in which he conveyed the thanks of the audience to their able instructors. The Hall was densely crowded during the entire evening, but none of the works of art exhibited sustained the slightest injury.

CLAPHAM.—Mr. J. Tell Topham delivered a lecture "On Thomas Moore, the Bard of Erin," at the Literary and Scientific Institution, on Friday, the 3rd inst. He commenced by affirming, that in all remarks on individual character, allowance should always be made for the peculiarity of the age, and the temperament of the man; justice requiring not a positive, but a relative estimate of character. The lecturer then traced the career of Moore, from his first arrival in London, criticising his satiric poems, the Irish Melodies, Lalla Rookh, and other productions, and enumerating his various prose works. His great misfortune was, that society idolised him. It was, however, a delightful remembrance that the flattery of nearly half a century did not spoil him. He never lost his good nature: his feelings, too, retained their freshness; and neither parents, nor family, nor home, were ever forgotten by him.

DEVONPORT.—Mr. R. Burnet, the founder of the Mechanics' Institute, has placed in the hands of the Committee the sum of £5, to be awarded as a prize for the best Essay "On the Best Mode of Educating Youth, so as to teach them to trust to their own energies, rather than to public or private patronage for advancement in life." The essays are to be sent in by the 1st of April. The premium is not limited to the members of the Institute.

DUNMOW.—On the 8th instant, the Rev. H. Gammidge gave a lecture at this Institution, on the "Commere of Ancient Times." He first defined commerce in general, and its main divisions; and stated that no apology was necessary for introducing this subject to the consideration of Englishmen. In ancient times wars and revolutions alone were recorded, but history would henceforth assume a different aspect, and embrace the friendly dealings of mankind with each other. The foundations of commerce were laid by Providence, which had so ordered things that different products were found in different countries; and the necessity of exchanging these had made the origin of commerce equal with the world. Its operations were first carried on by barter, and the things exchanged were for the most part flocks, herds, and the fruits of the earth. There were evident traces in the Mosaic writings of commercial transactions even before the flood; and such transactions greatly multiplied in the times of Abraham, Job, and Moses. From the Hebrews he passed to the Tyrians, and described their extensive operations by sea and land; illustrating his conclusions very happily by quotations from the Prophets. In the same lucid manner he selected the trade of ancient Egypt, and glanced at that of Greece and Rome. He then discussed the first introduction of coins, and of banks; and concluded with an impressive exhortation to the merchants of Britain to conduct their commerce with integrity, if they wished their country to escape the disastrous fate of Tyre. The President of the Institution, making a few remarks upon some points which had been touched on, returned the thanks of the meeting for this very able lecture.

HALIFAX.—The annual report of the Mechanics' Institution states, that during the past three years, the number of members had gradually increased from 412 to 550. The number of books issued from the library was 10,500, and of periodicals 4,200. During the same period 120 new volumes had been added. The news-room had been very successful, and was now one of the most popular features of the Institute. A considerable change had been made in the classes, by the substitute of paid for gratuitous teachers; and the result was very satisfactory. The average nightly attendance in the quarter ending on December was:—Juvenile writing and arithmetic, 87; first juvenile reading, 26; second do., 19; third do., 28; adult writing and arithmetic, 26; adult reading, 16; drawing, 8; French, 6. A discussion class has also been recently formed, and a grammar class upon the mutual improvement principle. In the female branch the attendance for the same time was:—Juvenile reading, 16; adult do., 14; geography, 17; arithmetic, 24; reading, 10; writing, 16. Mrs. Balfour had delivered four lectures at the Institution during the year. The total receipts during the year had been nearly £480, the expenditure about £435; so that they had been able to reduce their debt to the banker, from £159 1s., to £121 19s. 4d. The directors expressed their regret that their anticipation with respect to the erection of a new hall had not yet been realised.

MANCHESTER.—The annual report of the Institutional Association of the Literary and Mechanics' Institutions of Lancashire and Cheshire, states, that the number of institutions enrolled in the association at the present time was 38. Of these nine pay local rates, while thirteen, which include three large towns, with their own buildings, are allowed exemption. It was considered advisable for all Mechanics' Institutions to adopt a simple form of registry, which every person should sign on joining, whereby he or she engaged to obey the laws and rules of the institution. There had been an increase in the number of young persons attending the evening classes generally; and in three instances—Droyldsden, Oldham, and Bury,—female classes were alluded to. Throughout the whole district the steady decline of lectures was apparent. Where paid lecturers had been attempted the result was unsatisfactory, and gratuitous lecturing had also been attended with equivocal success. The report alluded to the arrangements entered into by the Society of Arts with different publishers for the supply of books at reduced rates, and expressed the opinion that no benefit could be gained by deviating from the ordinary channels of supply, as both in Manchester and in Leeds, booksellers could be found who were prepared to supply Mechanics' Institutions at 25 per cent. discount, free of carriage.

TONBRIDGE.—Mr. A. W. Hakewell delivered two lectures at the Literary Society, on the 8th and 9th instant, upon "The Study of Historical Paintings, considered as part of National Education." The lecturer elucidated his subject by observations on the original paintings by James Barry, at the Society of Arts, and exhibited some very fine engravings from those paintings, also executed by that artist.

WATERFORD.—The opening lecture of the Mechanics' Institute was delivered by Mr. W. L. Joynt, of Limerick, his subject being "The Importance of Supporting Literary Institutions." He referred to the suggestion for the formation of a Munster Union of Mechanics' Institutes, for the purpose of procuring lectures at a reasonable expense; and he urged the establishment of free libraries in the various boroughs in Ireland under the operation of the Museums and Libraries Act of last session, stating that it had been found that wherever a free library was established, it had given great support to the Mechanics' Institute. He recommended the members to petition Parliament for a grant of Parliamentary Papers, and to urge upon their representatives the desirability of giving that measure, as well as the bill shortly to be introduced into the House for the security of the property of Literary and Scientific Institutions, their most strenuous support.

WHITCHURCH.—Two interesting and instructive Lectures, on Popular Illusions, were delivered at the Mechanics' Institute on Wednesday and Thursday evenings, the 22nd and 23rd of February, by Mr. C. F. Partington. The gentleman commenced his lecture by showing how the eye and ear might be deceived by scientific ingenuity, treating upon the powers of electricity and magnetism in connection with the wonders of science, giving a lengthened explanation of the phenomena of Table Moving and other subjects.

WHITEHAVEN.—Through the able labours of Mr. Musgrave and his predecessor, the Mechanics' Institution is in possession of the nucleus of what promises to be, at no distant date, a museum second to none in the country. The committee of this Institution regret the small advantage that seems to be derivable, in the formation or enlargement of museums, from the exchange of specimens as suggested by the Society of Arts. Mr. Musgrave has been in direct communication with several Institutions, that expressed themselves desirous of such exchange, but the answers of all who acknowledged the receipt of the letters were very discouraging. He has now in his possession duplicate specimens illustrative of the geology of the neighbourhood of Whitehaven, and will be very glad, on his own account, or on behalf of the Institution, to exchange the same with any Institution in Union, for a like number of specimens descriptive of the geological characteristics of a district or any other branch of Natural History, or illustrative of any Arts or Manufactures carried on in any particular locality; the only cost to each party being the carriage of the parcels received.

Miscellanea.

WELSH IRON AND COAL TRADES.—The markets for the two great staple productions of South Wales are most active, and business is described as being unprecedentedly brisk. The demand for coal is enormous, and the consequence is, that every collier is fully employed, and new pits are being sunk. The quantity of steam-coal required for ocean-going steamers is extremely great, and a large trade is rapidly springing up in the port of Llanelly for this species of coal, which is found in that neighbourhood in great abundance. The large steam companies are using it, and the Government contracts require 20,000 tons of it for supply in the Baltic and Mediterranean. The iron trade is also very brisk, the large orders for foreign rails and home consumption rendering the market firm. One of the large works is about to be re-opened, having been closed some time, which will give employment to hundreds of men. The wages now given to the workmen are very remunerative, and none now are out on strike.

ANTHRACITE FOR STEAM PURPOSES.—According to the results arrived at by the experimental trip of the *Great Britain* to Australia with this species of fuel, it would appear that it is admirably adapted for all steam purposes, and for ocean voyages has a great superiority over all other sorts of fuel, by showing an economy of 10 per cent., stowing in a far smaller compass, creating no soot, ash, clinker, or dust, so as to choke the pipes, rendering it very unhealthy for the firemen, and covering the engines and ship with dust. On her first voyage to Australia she consumed from 50 to 60 cwts. per hour, while with anthracite the consumption in the 24 hours never exceeded from 30 to 40 tons—some days only from 15 to 20 tons. On leaving Liverpool the *Great Britain* took 1000 tons of best Pembrokeshire anthracite, and 800 tons of patent fuel. In the 13 days to St. Vincent, 880 tons were consumed; there 300 tons of Cardiff coal were taken in. After a voyage of 49 days she arrived at Port Philip, with upwards of 400 tons of coal in stock, having used about 820 tons from St. Vincent, or 1200 tons on the whole voyage from Liverpool to Port Philip. The men are better able to stand their work with anthracite than with other fuel. No fans were required to increase the blast, and with an ordinary draught it is perfectly easy and practicable, not only at all times to be enabled to generate steam, but likewise to maintain it.—*Mining Journal.*

AMERICAN DAGUERREOTYPE.—We have recently inspected some Daguerreotype Portraits executed in Philadelphia, which are as remarkable for their cheapness as their beauty. They are of the ordinary miniature size, coloured, and mounted in an oval frame, and then inserted in a folding ornamental case; the whole being executed for eight shillings. They are remarkable for their clearness and accuracy. The instantaneous character of such a mode of obtaining portraiture might surely render it cheaper among ourselves, and thousands obtain what hundreds only ask for now. It is an art cosmopolitan in its very nature. —*Art Journal.*

PAPER FROM WOOD.—In the last sitting of the Société d'Encouragement pour l'Industrie Nationale a paper was read setting forth a plan for making paper from wood. The bark is first taken off the wood, and the wood is then cut in such away as to be easily made into shavings; the shavings are then cut very thin; next they are placed in water for six or eight days, then they are dried, afterwards they are reduced to the finest powder possible by means of a corn mill. This powder is then mixed with the rags which serve to prepare the pulp of paper, and the ordinary operation of paper making is proceeded to. All white woods, such as the poplar. the lime, and the willow, are suitable for the purpose, but the discoverer ascribes a good deal of his success to the quality of the water he employed—that of the little river Doller, which runs near Mulhouse. For the first experiment he employed the wood of the trembling poplar, and he presented specimens of paper made from it.

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Mr. W. H. Monk, "On Chamber Music."
Actuaries, 7.—Mr. Samuel Brown, "On a method of classifying Life Policies so as to afford a ready means of forming a Table of Mortality from the experience of the Office."
Geographical, 8½.—1. Lieut.-Col. Lloyd, "Account of an Expedition to the sources of the Amazon, and sketch of the road from Lima to the Silver Mines of Cerro de Pasco." 2 Lieut.-Col. Lloyd, "Short Account of the Failure of the Darien Expedition." 3. Baron de Bode, "Notes on the Steppes of the Turkoman and Country South-East of the Caspian."

TUES. Royal Inst., 3.—Prof. J. Tyndall, "On Heat."
Meteorological, 7.—Dr. Moffat, "On Medical Meteorology and Atmospheric Ozone."
Civil Engineers, 8.—Renewed Discussions. 1. On Ruthven's Propeller; and 2. On Decimal Coinage. 3. Mr. J. Brunlee's "Description of Embankments across Morecombe Bay."
Medical Chirurgical, 8½.
Zoological, 9.

WED. London Inst., 2.—Mr. E. W. Brayley, jun., "On Physical Geography.
Society of Arts, 8.—Mr. Leone Levi, "On the Importance of a Correct System of Agricultural Statistics."
Microscopical, 8.

THURS. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
London Inst., 7.—Mr. C. Cowden Clarke, "On the great Novel writers of Europe."
Chemical, 8.—Anniversary.
Antiquaries, 8.
Royal, 8½.

FRI. Architectural Assoc., 8.
Royal Inst., 8½.—Dr. J. H. Gladstone, "On Chemical Affinity among substances in Solution."

SAT. London Inst., 2.—Mr. E. W. Brayley, jun., "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-Metallic Elements."
Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 10th March, 1854.

Par. Numb.
99. Barnstaple Bribery Bill (1819)—Return.
102. Bullion, &c.—Return.
103. Committee of Selection—Sixth Report.
104. Prince Edward's Island—Return.

Delivered on 17th March, 1854.

106. Railway and Canal Bills Committee—Third Report.
43. Bill—Declarations.
Church Estates Commissioners—Third General Report.
Ecclesiastical Commissioners for England—Sixth General Report.
Natal—Further Correspondence.

Delivered on 18th and 20th March, 1854.

70. Savings' Banks (Number of Depositors, &c.)—Accounts.
71. Savings' Banks—Return.
100. Towns (Ireland)—Return.
110. Menai Straits—Copies of Memorial and Report.
44. Local Acts—Reports from the Admiralty.
105. Railway (Number of persons employed, &c.)—Return.
40. Bills—Highways (District Surveyors).
41. Bills—High Treason (Ireland).
42. Bills—Property Disposal.
44. Bills—Friendly Societies (Amended).
46. Bills—Oxford University.
47. Bills—Church Building Acts Amendment (Amended).
Eastern Papers—Parts 5 and 6.
Prisons (Scotland)—Fifteenth Report of the General Board of Directors.
Turnpike Trusts—First Report by the Secretary of State.
Railways (Number of Passengers, &c.)—Return.

Delivered on 21st March, 1854.

44. Local Acts—Reports from the Admiralty.
94. Teinds (Scotland)—Return.

111. Expiring Laws—Report from Committee.
Russia and Turkey—Treaties (Political and Territorial, 1774-1849).

Delivered on 22nd March, 1854.

9 (1). Rent Charges (Ireland)—Return.
92. Duchy of Lancaster—Account.
107. Cattle—Account.
112. City of London Tolls—Return.
Importation of Guano—Correspondence with the Peruvian Government.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, 17*th March*, 1854.]

Dated 17th October, 1853.

2389. W. Roy, sen., Cross Arthurlie—Colouring matters for printing.

Dated 13th February, 1854.

352. A. V. Newton, 66, Chancery lane—Protecting iron from oxidation.

Dated 22nd February, 1854.

428. E. Massey, 3, Tysoe street, Clerkenwell—Ships' logs.

Dated 28th February, 1854.

477. L. A. Pallegoix and A. L. Bellange, Paris—Treating wheat.
479. F. S. Thomas, 17, Cornhill—Rifle carriage.
481. A. E. L. Bellford, 16, Castle street, Holborn—Admitting steam, &c., to cylinders of oscillating engines. (A communication.)
485. A. L. Mallet, 52, Rue de la Pepiniere, Paris—Apparatus to destroy effects of shocks.
487. J. Medwin, Blackfriars road—Water guages for steam boilers.
489. J. T. Way, Holles street, Cavendish square, and J. M. Paine, Farnham—Gas.
491. J. S. Holbeche, Sutton Coldfield—Invalid bedsteads.

Dated 1st March, 1854.

493. H. Gilbert, Suffolk street, Pall Mall—Artificial teeth.
495. W. Ehrhardt, Birmingham—Ordnance and fire arms.
497. W. J. Curtis, 23, Birchin lane—Levigating machine.
501. J. and T. Sibley, Ashton under Lyne—Cutting discs out of metal plates.
503. M. N. Illakowicz, 35, Maddox street—Picture frames.
505. J. S. Holland, Woolwich—Locks.
507. J. Parry, jun., Liverpool—Mills for grinding bones, &c. (A communication.)
508. R. V. Houssart, 29, Dunstan street, Kingsland road, and R. Houston, 1, Skinner street—Vessels to contain fluids.
509. H. and J. Ellis, Salford—Finishing, &c., woven fabrics.
510. A. Barclay, Kilmarnock—Lubricating shafts.
511. A. Barclay, Kilmarnock—Mining engines.
512. J. Currie, Glasgow—Grinding grain.
513. T. Dawson, King's Arms Yard—Umbrellas and parasols.
514. J. Tann, Minerva terrace, Hackney road—Locks.

Dated 3rd March, 1854.

516. T. and R. Yates, Bury—Looms.
518. L. Tindall, Scarborough—Churns.
520. G. Spill, Old Farm House, Stepney—Hats.
521. W. E. Newton, 66, Chancery lane—Measuring and folding cloth. (A communication.)
522. C. Bloomer, West Bromwich—Spikes and bolts.
523. J. B[illegible], Mauritius—Evaporating saccharine liquids.
524. W Vaughan, Stockport, and J. Scattergood, Heaton Norris—Weaving.

Dated 4th March, 1854.

526. C. Nightingale, Wardour street—Curling horse hair.
528. R. Madeley, Birmingham—Metallic bedsteads, &c.
530. H. D. Mertens, Margate—Steam engine valves. (A communication.)
532. J. K. Stuart, Glasgow—Hats.

Dated 6th March, 1854.

534. J. Warhurst, Hollingworth—Steam boilers.
538. T. H. de Nivelles, Foley place—Separating metallic from earthy substances.
540. P. A. de S. S. Sicard, Paris—Purifying water.
542. B. Brokenshar, St. Austell—Amalgamator.

Dated 7th March, 1854.

544. W. Clay, Liverpool—Manufacture of axles, &c.
546. G. Chant, Stoke sub Hamdon—Fan, parasol, or sun shade.

Dated 8th March, 1854.

548. H. B. Barker, Manchester—Waterproofing fabrics. (A communication.)
549. G. Beardsley, Coal pit lane—Textile and looped fabrics.
552. J. D. Brunton, Truro—Wind guards.
556. G. Devincenzi, Grosvenor street—Ornamented surfaces, &c.
558. W. Warne, St. Austell—Tubular steam boilers.
560. J. Blair, Irvine—Beds or couches.

WEEKLY LIST OF PATENTS SEALED.

Sealed March 15th, 1854.

2161. Baldwin Fulford Weatherdon, of Chancery lane, and Matthew Slade Hooper, of Sydenham—Improvements in railway signals.

Sealed March 17th, 1854.

2168. Henry Baron de Bode, of 8, Albert street, Camden road—Improvements in the manufacture of wheels.

Sealed March 18th, 1854.

2174. Thomas Restell, of the Strand—Improvements in opening and closing ventilating louvres.
2194. Thomas West Walker, of Hanley—Improvements in the manufacture of crates made of wood for the use of potters.
2228. Michel Ovide Bernard Lesage, of Paris—Improvements in hydraulic engines.
2233. Thomas William Kennard, of Duke street, Adelphi—Improvements in constructing piers and foundations under water.
2332. William Muir Campbell, of Glasgow—Improvements in earthenware kilns.
2505. Andrew Maclure, of Walbrook—Improvements in lithographic printing presses.
2651. James Wills Wayte, of Gate street, Lincoln's inn fields—Improvements in self-feeding furnaces.
2958. Paul Wagenmann, of Bonn—Improvements in the manufacture of liquid hydro-carbons and parafine.
3008. John Macintosh, of 12, Pall Mall East—Improvement in discharging projectiles.
57. Elmer Townsend, of Boston, U. S.—Improvements in machinery for sewing cloth, leather, or other material. (A communication.)
101. George Fergusson Wilson, of Belmont, Vauxhall—Improvement in the manufacture of candles and night lights.
108. Edward Highton, of Regent's park—Improvements in suspending the wires of electric telegraphs.
134. Nehemiah Hunt, of the State of Massachusetts, U. S.—Improvements in machinery for sewing cloth or other material. (A communication.)
147. Henry Watson, of High Bridge, Newcastle upon Tyne—Improvements in water closets.
178. John Ridgway, of Cauldon place—Improvements in the method of generating and applying heat to kilns, ovens, and furnaces, for manufacturing purposes.

Sealed March 20th, 1854.

2181. Ferdinand Potts, of Birmingham—Improvements in the manufacture of paper tubes, and in the apparatus connected therewith.
2184. Henry Needham, of Wardour street—Improvements in revolving fire-arms.

Sealed March 22nd, 1854.

2190. James Baldwin, of Birmingham—Improvements in the making of paper bags.
2191. Frederick Crace Calvert, of Manchester—Certain improved processes for separating emery from other matters.
2235. Peter Armand Le Comte de Fontainemorean, of South street, Finsbury—Improvements in treating certain exotic plants for the production of a fibrous substance, known in commerce by the name of vegetable silk. (A communication.)
2293. James Bullough, of Accrington, and John Walmsley and David Whittaker, of Blackburn—Improvements in machinery or apparatus for warping and sizing, or otherwise preparing yarns or warps to be woven.
2353. William Muir Campbell, of Glasgow—Improvements in potters' or earthenware kilns.
2411. Robert Shaw, of Glasgow—Improvements in writing instruments.
2521. John Crowley, of Sheffield—Improvements in the construction of ovens and furnaces.
2777. Louis Alexandre Michel, of Paris—Invention of a system of apparatus for sawing and breaking sugar.

1853.

25. William Rigby, of Glasgow—Improvements in steam-hammers and pile-driving machinery.
35. John Davie Morries Stirling, of the Larches, near Birmingham—Improvements in the manufacture of iron.
71. Henry Beaumont Leeson, of Greenwich—Improvements in gas burners.
165. Henry Seebohm, of Esholt, near Leeds—Improvements in combing wool, goats hair, alpaca, cotton, and other fibrous materials.
205. Thomas Thurlby, of Guildford street East, Spa fields—Improvements in the means of effecting instant communication between distant points of railway trains.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854. March 18.	3577	An Artiste's Cornet à Piston	Henry Distin	Cranbourne street, Leicester square.
" 21.	3578	Seamless Lady's Shoe	Walter Hart	Horns lane, King street, Norwich.

Journal of the Society of Arts.

FRIDAY, MARCH 31, 1854.

SIXTEENTH ORDINARY MEETING.

Wednesday, March 29, 1854.

The Sixteenth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 29th instant, the Right Honourable the Earl of Harrowby in the chair.

The following candidates were balloted for and duly elected:—

Emslie, John	Keating, The Venerable Archdeacon
Headlam, Tho. Emerson, M.P.	Salmon, John C.
Rush, G. W.	Wilson, Isaac

The following Institution has been taken into Union since the last announcement:—

355. Weston-super-Mare, Athenæum.

Previous to the reading of the paper, the Secretary called attention to some specimens of Cambay stones, which will be found described at page 618, Vol. 1, of this Journal, and also to some specimens illustrative of the electro-plating of metallic articles with white metals, which is explained at page 340 of the present number.

The Paper read was

ON THE IMPORTANCE OF A CORRECT SYSTEM OF AGRICULTURAL STATISTICS.

By Leone Levi, F.S.S.

Of all questions that of subsistence is the most important which could engage the attention of the legislator, the senator, the statist, or the civilian. It is the touchstone which draws into it all the elements of public and social welfare. It is the foundation of national prosperity, and the essential of individual happiness. When one of our mighty floating palaces weighs her anchor for a long passage across the ocean the first of her preparatory duties is the purchase of provisions—to see that a sufficiency of stores is provided for her crew and passengers. And when on the setting in of winter we enter on our yearly pilgrimage, is it not the duty of a nation as of individuals, to make an estimate of the amount of food we are likely to have—whether we shall have full rations, or have to make up with half a one? And yet we are blindly groping our way, eating, perhaps, in superabundance for a few short months, and when well entered into the gulf of our yearly existence we must put into a port of distress to purchase food, at whatever prices it can be got, and to compete with the famished crew of many nations, in exhausting the surplus of a scantily provisioned stock of grain.

What are agricultural statistics but a computation of the number of loaves we shall obtain from our own fields for one agricultural year, and how many pounds of meat we shall get from our cattle? These are surely practical questions which cannot be misunderstood. And yet whilst their plainness defies speculation, mountains of difficulties arise, and a phantom disturbs our vision, so that we are driven back from our inquiry without further consideration. What is our field of operati. n? The arable and garden land of the United Kingdom is about twenty millions of acres, and the meadows, pastures, and marshes contain twenty-seven millions, a surface considerably smaller than that of many other countries. The number of farmers in Great Britain actually does not exceed 300,000, so that in the extended practice of large holdings any calculation becomes circumscribed and easy. We may conceive that in such an immense country as Russia, with half the land comparatively raw and unapproachable by the ice, or in such a country as the United States, now only subjected to human strength by the iron axe of the sturdy settler, it will, indeed, prove difficult to scan it all over, to compute the number of acres sown with different crops, and the number of quarters of grain which they yield. No such difficulty ought to be experienced within the British Islands, every portion of which has been long explored, inhabited, and tested as to its capabilities to the best of human powers and ingenuity.

But experience is the mother of wisdom. What does it teach? Have attempts carefully made actually failed? On the contrary, we find that individual merchants, such as Mr. Sandars and Mr. Hodgson, of Liverpool, have obtained pretty accurate accounts by sending individuals into different parts of the country whilst the grain is yet in the ear, to cut out a square yard and see what it would produce in the different kinds of land—clay lands, sandy lands, &c. The Highland and Agricultural Society of Scotland have recently transmitted abstracts of returns of the Agricultural Statistics of the Counties of Roxburgh, Haddington, and Sutherland, returns which called forth the approbation of the Board of Trade. There we find the number of acres under different kinds of crop; the amount of stock; and also the amount of steam. water, and horse power employed agriculturally in East Lothian, and an estimate of the produce of the crops. Similar statistics have also been obtained for the counties of Norfolk and Hampshire. But the most complete answer which may be given to those who apprehend insurmountable difficulties, is to be found in the satisfactory results of the statistics of the produce of Ireland, collected by the efficient aid of the Constabulary and Metropolitan Police, on printed forms, and in pursuance of instructions supplied to them. It is not asserted they are perfect; it is physically and morally impossible that such statistics can ever be perfect, but as a whole, for all practical purposes, they may be considered a most successful performance. These furnish the number of holdings, the extent of land under crop, and an estimate of the quantity of produce by counties and by Poor Law Unions; the rate of produce, the classification of crops, the breadth of flax cultivated in each county and the numbers of stock of all descriptions.

To arrive at a correct appreciation of the subject, we must first be convinced of its importance, and of its expediency, then distinctly apprehend what is required, and, lastly, by what means it may be attained. On the importance and expediency of collecting statistics of agricultural produce, it might seem scarcely necessary to enlarge, but the claims of statistical science in this direction, have not hitherto been universally recognized. It is a melancholy truth, that as yet few believe in statistics. The philosophy of inductive science is with large numbers a mysterious problem. Every body admits that if in repeated instances, over a long space of time, a certain event has happened at certain periods there is good ground for believing that the same will continue to happen; but a preconceived scepticism in numbers prevents them applying common reason to great but every day occurrences. They have not the power of magnifying figures, and of preserving the same faith in them. Besides, other considerations, foreign to the purpose, as well as self-interest, political tendencies, or dread of revelations, enter the mind, and are sufficient to make them decided enemies to statistical inquiries. The masses must, therefore, be taught the meaning of statistics, their object and province. Statistics is the science of observation. It takes actual facts and studies them in their nature and effects. It is founded on experience rather than on theory. A chemical discovery is made

It is applied to the cultivation of the soil. The statistics of produce of that soil before and after the application of such chemical discovery, is the surest test of its worth. Within the domain of statistics is whatever is important to the interest of a State, whether it be Institutions, physical forces, education, science, crime, or religion. Its province is to elaborate truths which lie remote from the surface of daily life, and to reduce into statistical analysis, the wants, the resources, and the experiences of society at large. In the words of the fifteenth annual report of the Statistical Society of London:—"Man in society is the subject of our study; to detect the influences which bear upon his welfare, our ultimate aim; inductive reasoning from phenomena observable, and observed with mathematical precision our method, and to make use of all evidence of this character which may be turned up in the early working of society, as well as to collect new data our necessity." As to the statistics of agriculture, we have abundant evidence that a sufficiency of supplies of food for the growing population is most important to the moral, political, and material welfare of a state. When misery prevails crime abounds. When corn is dear a cry for reform finds a ready ear; and when our loaves cost 10d. instead of 6d. money is dear, prices of manufactures are low and labour is scarce. It is to enable us to meet these contingencies betimes that agricultural statistics are wanted. If we possess an early estimate of what we are likely to require from foreign countries, we shall be able to send ships to the Baltic long before the Russian ports are frozen, and shall be early in the markets to provide for our wants. We must remember, that as the harvest on the Continent is generally two months earlier than in this country, they have the first chance of obtaining their supplies at cheaper rates than we can, when our wants are fully manifested.

It is not then an abstract question, but one of great practical bearing to possess proper statistics of agricultural produce. Its pounds, shilling, and pence value is not less evident. The Deputation from the City lately presented a petition on the subject to Lord Aberdeen, and it was by them stated, that the quantity of corn annually sold in the United Kingdom is not less than 40 million quarters, and the simple oscillation of 1s. per quarter would make a difference of about two millions sterling. The fluctuations in prices in the last few years is as follows.—

Highest and Lowest Average Prices of Grain from the year 1846 *to* 1853.

Years.	Highest. s.	d.	Lowest. s.	d.	Difference. s.	d.	Per Cent.
1846	62	3	45	1	17	2	27
1847	102	5	49	6	52	11	50
1848	56	10	46	10	10	0	18
1849	49	1	38	9	10	4	20
1850	44	1	36	11	7	2	16
1851	43	6	36	9	6	9	15
1852	45	11	37	2	8	9	17
1853	73	0	43	3	29	9	39

The shipowners also find in this uncertainty the utmost difficulty in providing ships, the difference in the tonnage alone being estimated at one million tons.

Having so far established the position, that it is important and expedient to obtain agricultural statistics, we shall proceed to the second enquiry, and the most important one, viz., What kind of statistics, and at what intervals of time, and at what months of the year are they required? The important object to be kept in mind is, that of all statistics agricultural statistics are intended to meet a substantial want. We cannot adapt our wants to such statistics, but we must adapt such statistics, and the machinery for obtaining them, to what is felt necessary. To have the statistics of the quantity of food at our disposal for a given time, when that quantity is all eaten up, is altogether absurd. And yet such are the agricultural statistics of Ireland, which appear a year and a quarter after each harvest. The same may be said of the returns received from the Highland Society, and of those not yet published for the counties of Norfolk and Hampshire. What is wanted is, first, how many acres of land are sown with each kind of crop; secondly, the probable yield, and this sufficiently in time to govern the markets, to check alarm, or to give a timely warning of impending wants. We know our wants, if we do not know our supplies. We know that a population of 28 millions will require 28 millions of quarters annually of wheat and flour, besides what is wanted for cattle, horses, malting, and other purposes. Already our population is largely dependent on foreign wheat. Estimating the yearly consumption of each individual at eight bushels, and taking the average yearly importation of wheat and wheat-flour, it seems that whilst from 1801 to 1810, the mean population of Great Britain being 11,769,725, the number of persons fed upon foreign wheat was 600,946. From 1841 to 1850, the mean population being 19,967,876, the number dependent upon foreign wheat and wheat-flour was not less than 2,818,328. The quantity of grain imported from 1847 to 1853 was as follows:—

Grain Imported into the United Kingdom from 1847 *to* 1853.

Years.	Quarters.
1847	11,672,533
1848	7,528,483
1849	10,669,661
1850	9,019,579
1851	9,618,026
1852	7,779,145
1853	10,068,665
	66,356,092
Average	9,479,441

Formerly the quantity imported yearly, varied considerably. One year we might want one or two millions of quarters; the next, nothing. Of late, however, the importation has been uniformly large, leaving a conviction that our agricultural produce does not keep pace with the increase of our population, and with their growing resources; and we are the more interested to ascertain as early as possible what is that amount of extra supplies which will be required to meet our already large want of foreign help. Of the two subjects of enquiry,—how many acres of land are sown, and the probable yield—the former is easier ascertained than the latter. In both there must necessarily be some looseness. The first would embrace the number of acres sown with wheat, barley, oats, rye, beans, peas, flax, seeds, turnips, potatoes; the number of acres in permanent grass, and the number in annual grass, &c. The second, an estimate of the probable yield of each per acre. The returns of the number of acres under crop might be collected early in spring. By extensive meteorological observations, the progress of vegetation might also be obtained at various intervals. The estimate of the produce should be obtained within one month, at the latest, after the harvest. The difficulty of obtaining the accounts at such an early period is doubtless considerable, having regard to the time requisite for printing, distributing, collecting, and classifying the returns It has been suggested by Mr. G. Wingrove Cooke to select in every county some few parishes, which shall fairly represent all the diversities of soil, culture, and climate, that obtain throughout the county. Having settled on the representative parishes, subject, of course, to changing them for others, if any alteration should occur in their culture which would destroy their representative character, returns should be collected of the culture and produce of such representative parishes, which, by due calculation of the proportion of the parish to the district, would exhibit the agricultural statistics of the county.

Hitherto we have spoken of annual estimates. It may also be important to obtain decennially more complete

agricultural statistics for purposes of taxation, and for the object of showing the progress of agricultural science. The Statistical Congress, lately held in Brussels, at which there were official representatives and men of science from thirty-two countries, confined its recommendation to decennial statistics. At these distant intervals the statistics might furnish complete information on the conditions, proceeds, and results of agricultural industry, comprising facts with reference,—1st. To the soil itself. 2nd. To the natural phenomena which fall under the observation of the cultivator. 3rd. To the implements used for cultivating the land. 4th. To the means employed to supply the substances with which the soil is wanting. 5th. To the domestic animals. 6th. To the special culture of each useful vegetable. 7th. To the laws of production, division, and consumption of agricultural produce; and 8th. To the relation of agriculture to society. All these various items of information do not form an essential part of agricultural science. What concerns the soil, its nature, and its properties, belong properly to geology. Natural phenomena are within the domains of physics, zoology, or botany. The Statistical Congress did not consider it possible to reduce all these subjects in the form of statistics, and therefore simply recommended generally that the information should comprise all the conditions, proceeds and results of the agricultural industry of the country at a given time, and all the facts which may assist towards the proper appreciation of them in all their different aspects. This is also exceedingly useful. But what is most essential, is the annual estimate, and that is the great practical object aimed at by the advocates of agricultural statistics in this country.

Now that we have cleared our path as to the objects and requisites of agricultural statistics, we shall consider the means by which they may be obtained. One might think that what is actually required is not such an enormous labour after all. The difficulties are more imaginary than real, and the enquiries are such as private individuals, stimulated by interest and enterprize, often partially carry out by themselves. We have already pointed out what Messrs. Hodgson and Sandars, of Liverpool, have done. Another illustration of a similar character may be produced. A corn-factor of London, in 1850, sent a large number of schedules containing questions on the results of the potato crop in Ireland. He received a number of replies, some from Roman Catholic clergyman, some from millers and dealers in the corn trade, and some from land-holders, public functionaries, &c. The replies referred to all parts of the country, and they constituted a comparison of the potato crop of that year with the preceding one. They showed in what, and how many districts the tubers were not affected, where slightly, where partially, where much, and where at all affected,—then, as to the portion of the crop that would be saved for human food. The reports gave, also, accounts of the wheat crop, describing in how many districts it was deficient; in how many a fair average, a good average, and where abundant. These are successful experiments by individuals. The same may be said of the quarterly meteorological observations made by Mr. Glashier in forty two places of Great Britain. There is one great advantage in individual efforts,—the responsibility is less; inaccuracies are excusable; the credit attached to them is proportioned to their intrinsic value. Not so with government accounts. They come out with all the credit and *éclat* of official statements, and if they prove erroneous, they mislead a much larger number of persons; and it should be a principle of action on the part of government, whenever it is not in their power to produce strictly correct accounts, to leave private individuals to make them on their own responsibility. With respect, however, to agricultural statistics, it needs be a vast national measure, co-extensive with the kingdom itself, requiring considerable and permanent machinery, such as no private energy can in any case supply, and, like the census of population, the statistics of education or of crime, it behoves government to undertake it by the best means at their command. This duty government is about to assume, and it is all-important that all classes—the farmers, the merchants, the land-holders, and the magistrates—should afford them their moral and physical co-operation. Let us now see what is the machinery at their command for such a purpose. At the suggestion of the late talented Mr. Porter, a statistical department was formed in 1832 connected with the Board of Trade. Such department has hitherto not extended its functions beyond the statistics of commerce and shipping, but the principle which it embodies is, that it should become a department for the registration of all the statistics of the country; that whilst the other offices are for administration, for direction, for inquiry, for legislation, &c., this should be for registration, or for the statistics of trade and commerce, population, agriculture, industry, crime, &c. A statistical department of such a character has been established in most countries. The statistics of agriculture, should devolve on the Statistical Department of the Board of Trade; but that office would require to be expanded and reconstructed to undertake this important duty. The next statistical organisation in this country is that of the Registrar General for births, deaths, and marriages. That office lately exhibited an unparalleled activity and ability for performance of labour, in the collecting of the census, by the wonderful machinery employed, by the expedition with which the returns were collected, and by the extent of the information obtained. This office has already ascertained the number of farmers in Great Britain, and also the number of farms, and their size. The plan they adopted was (the enumerators being above 30,000 in number) to deliver to every occupier of a house or tenement a householder's schedule, 7,000,000 in number, weighing in the aggregate nearly 40 tons. They trusted to the parties to fill such papers honestly and in the best way they could, and notwithstanding the difficulty of getting ladies to tell their ages, and many other local or personal prejudices, they obtained the most comprehensive returns ever published. The same plan could be pursued for agricultural statistics as for statistics of population. Schedules might be annually sent to the 300,000 farmers, and the result, in course of time, would, undoubtedly, be as satisfactory as by any other means. In Belgium they pursued the same plan. In France they formed commissions and sub-commissions spread throughout the country, a most complicated and unsatisfactory process. The other statistical organisation, which Government seems disposed to adopt is, the Poor Law Board; and it is by their instrumentality, that agricultural statistics have lately been obtained for the counties of Norfolk and Hampshire. I confess I have a strong aversion to the machinery of the Poor Law for this purpose, and fear that the associations connected with it may prove injurious to the object in view. The plan pursued in the case of the foregoing counties, was as follows. The Poor Law Board sent schedules to the Board of Guardians. These were handed to the enumerators, or relieving officers of the parishes, who distributed them among the occupiers of the land, and got them filled up. A committee was moreover appointed by the Board of Guardians, consisting of some of the guardians and some experienced farmers, to inspect the proceedings; and where any farmer objected to give returns, to direct themselves to the proprietor himself or otherwise. The experiment proved successful. But it should be observed, that the counties of Norfolk and Hampshire are counties much advanced both in intelligence and resources.

With regard to Scotland, the Highland and Agricultural Society having succeeded in the statistics of three counties, they, in all probability, will be entrusted with the entire management for that part of the kingdom. In a letter addressed by the Secretary of that Society to the Board of Trade, the following statement was made respecting the mode pursued in collecting the statistics:—

"When the extent of acreage was collected, occupiers

of land were informed that the report would be so prepared as to preclude the possibility of particulars in regard to individuals being divulged. The first return therefore only indicated the extent of the crops in districts comprising several parishes; and in conformity with this principle, the return now forwarded contains the estimated produce of the same districts. A record of the extent of the crops in every parish was then preserved, and a statement of the average produce of each has now been prepared: but as it was considered inexpedient to publish the details of parishes in the one instance, I presume it will be objectionable in the other.

"The machinery employed in obtaining the estimates was simple, and proved efficient. In every district there was a committee composed of the enumerators and experienced farmers, selected from—and representing each of the associated parishes.

"The nature and object of their services were explained in a circular addressed by me to the members of these committees before harvest, their attention was called to the standing crops, and they were requested to institute inquiry, and obtain information within their respective parishes. Their observations were continued during the progress of the harvest; and at a later period, when experiments in thrashing and weighing had been made, the committees were convened by their enumerators, the views of the members were compared and considered, and a statement was prepared and forwarded to me, showing the average acreable produce of each parish, in bushels of grain and tons of roots."

Such is the mode adopted by the Highland and Agricultural Society of Scotland.

It would remain now to notice that objections have been raised on the part of some of the farmers. They fear the results of such statistics—that such may be subsequently used to their disadvantage, either by imposing on them new taxes or by the raising of the rents, or that they are intended for some political purposes. Such objections it is all important to remove by convincing the farmers of the utility of such accounts, and by showing them their bearing on the price of produce, and on the public welfare. Sir John Boileau proposes that commissioners be sent throughout the country to extend information among the farmers on the subject of agricultural statistics, and though the plan would be attended with considerable expense, it would have the effect of removing any prejudice which may still exist against such statistics, and facilitate materially the obtaining of compendious accounts from the most distant provinces.

Having now expatiated on the expediency of obtaining such statistics, let us make some use of what are within our reach in this and other countries; calling your attention to the table of cultivated land, population, produce, and stock of some important continental States. We shall not follow the table which is appended, but offer some general observations on the principal topics it suggests. Russia by far exceeds any other country in the extent of soil under cultivation, but such is the disproportion which exists in the 51 Governments into which that country is divided, that whilst two Governments, Toula and Tschervigow have 3-5ths of the land under cultivation, Astrakhan and Arkhangel have no more than 1-1,000th. The state of agriculture in Russia suffers materially for want of rain. The average quantity of rain is given as follows, by M. Gasperin in French inches.

In the west of England	37.59
East do.	26.56
West of Europe	26.12
Southern parts of Greece and France .	34.43
Northern parts of France and Germany .	25.64
Russia	15.88

Agriculture is also affected there by the want of population in many parts of the country, whilst in others it abounds. But the greatest evil inflicted on agriculture is the system of servitude which prevails. In 1834 the number of cultivators, serfs, or slaves, was above ten millions, or 46 per cent of the total agricultural population.

Another important object in agriculture is the subdivision of real property. In France in 1835 there were as many as 10,893,528 distinct properties. In Ireland the number of holdings exceeding one acre in extent, was, in 1852, 550,413. The produce of grain is largest in Russia; but the United States far exceed in the variety and abundance of other produce, especially cotton, tobacco, &c. The amount of cattle and sheep, in proportion to the population, is largest in Great Britain and Ireland. The United States have a larger number of cattle, but Great Britain possesses double the number of sheep, whilst the United States have double the number of pigs. As to the value of agricultural produce the census of the United States gives the cash value of farms at 900,000,000*l.*, and the value of farming implements at 32,000,000*l.*, that of live stock at 100,000,000*l.* M'Culloch gives the value of the crops of the British Empire at 120 millions sterling, and the value of land in England at 128 millions. The total value of the vegetable kingdom in Russia is given by Tegobonski at 260 millions sterling. These figures sufficiently demonstrate the immensity of the provisions which a gracious providence has afforded to mankind. We have viewed the agricultural resources of but few countries, and left untouched Germany, Spain, South America, the East and West Indies, and Australia.

It has already appeared that the improvement of agriculture in this country has scarcely kept pace with the increase of population. In the report of the census of 1851, it is stated that the rate at which the population of Great Britain increased, from 1801 to 1851, is such that if it continue to prevail uniformly, the population will double itself every 52.5 years. That is to say, the population of Great Britain, in 1903, may be expected to reach 42,243,934 souls, who will require 42,000,000 of quarters of wheat and wheat flour per annum. Will Great Britain extend its productive forces in an equal ratio? Much has of late been accomplished in agricultural science. The great discoveries of chemistry, the results of meteorological observations, the extension and application of agricultural mechanics, the improvements made in the land by draining, by the removal of useless fences, by the diminution of fourfooted game, by the introduction of new kinds of manures, by irrigation, and by improvement of farm buildings, have all considerably enlarged the prospects of British agriculture. The progress of agricultural science is greatly owing to the combination of scientific with practical instruction in agriculture. This science is now taught in the National Universities, where professorships of rural economy, agricultural chemistry, botany, and geology, have been established. Agricultural colleges and model farms, for acquiring acquaintance with the management of a farm, have also been introduced with eminent success; whilst the agricultural institutions, such as the Royal Agricultural Society of England, the Highland and Agricultural Society of Scotland, and the Royal Agricultural Improvement Society of Ireland, have contributed materially in encouraging men of science to turn their attention to agriculture, in promoting the discovery of new varieties of grain useful to man, or for the food of domestic animals, and in the spreading of sound information on all subjects connected with practical husbandry. Yet there is limitation even in productiveness and improvements. Political economy has brought to light a great principle in the law of production. Mr. J. Stuart Mill says, "Land differs from the other elements of production, labour, and capital, in not being susceptible of indefinite increase. After a certain and not very advanced stage in the progress of agriculture, as soon, in fact, as mankind have applied themselves to cultivation with any energy, and brought to it any tolerable tools—from that time, it is the law of production from the land, that in any given state of agricultural skill and knowledge, by increasing the labour, the produce is not increased in an equal de-

gree—doubling the labour does not double the produce." Such being the law of production, and the quantity of land capable of improvement in the United Kingdom being limited, we must direct our eyes to emigration. A migratory character is the law of all human beings. Geology discovers the bones of elephants in the arteries of these northern islands. How they came here we know not. The back woods of America, the antipodes of Australia, are being peopled with the surplus of our population. In the last decennium, to 1851, we sent them as many as 2,688,746 inhabitants, and emigration is still proceeding at the rate of 300,000 a year. New empires are thus created—the bounties of the earth multiplied—civilization, commerce and religion shed their benign influence into continents and islands. And though passions and ambition still control our actions, and wars and anarchy still infest our borders; though ignorance is still the lot of the masses—and though slavery still offers with impunity a sacrilege of God's creation in Republican America—there is a future solemnly advancing, of newer life and newer principles—science, majestically revealing the machinery of the great Universe—and our vision brightening beyond that starry firmament whose brilliant appearance raises our aspirations and ennobles our thoughts.

Reverting to our immediate subject, we have shown that the collection of agricultural statistics is an essential duty of the nation and of individuals—that it is a duty, the performance of which demanding an extensive and permanent machinery, it behoves Government to undertake—that the difficulties to its performance are more ephemeral than real, and that the objections raised against it are inconsistent with the true interests of the nation collectively, and of the individuals composing it respectively. Also that such agricultural statistics may be collected, either through the Registrar General, or the same machinery by which the recent census of population was collected, or through the Poor Law Board, and that whichever means is adopted by Government, it is all-important that it be sanctioned by public opinion, and strengthened by individual efforts. Lastly, that such an inquiry is demanded, by the uncertainty to which the people is exposed, as to the amount of food it possesses within a certain time, with its ever-increasing wants—by the fluctuation which follows in the prices of produce, often doubling or reducing its value, even to the extent of cent. per cent., and by the necessity of having a timely warning of future wants. Further, that it is a measure both expedient and necessary to the legislators to ascertain and study the wants, the resources, and the productive forces of the State whose helm they bear—to the jurist and moralist to ponder over those moral phenomena, so powerfully developed by abundance or indigence, by the prevalence or declension of aggrarian crimes and offences against persons and property—to the merchant, to appreciate the extent of the field into which he is to operate, to be prompt, energetic, and calculating in his speculation, or to be slow in giving credence to vague fears and apprehensions—to the shipowners, to afford sufficient amount of shipping to meet this imperative national want of bringing food from afar—and to the farmer himself, to regulate his dealing in the market, to learn the productive capacities of the soil, and to establish the true basis for the adaptation and connection of science with agriculture.

AREA, POPULATION, AND AGRICULTURAL PRODUCE OF THE FOLLOWING COUNTRIES.

Countries.	Area in Acres.	Population.	Grain.	Horses.	Cattle.	Sheep and Goats.	Pigs.
Great Britain .... Ireland	Under crop, 16,090,000 Under crop . 5,695,347 (Return, 1853.)	Census, 1851. 21,121,967 6,551,970	England, 42,100,000 qrs. Potatoes, 34,044,831 bushls. Wheat . 1,154,205 qrs. Oats . . 11,712,528 ,, Barley . 1,257,398 ,, Bere . . 231,075 ,, Rye . . 63,289 ,, Beans . 83,187 ,, Peas . 37,634 ,, Turnips 5,675,897 tons. Flax . . 5,673,994 { stone. 14lbs.	1,161,000 545,900	15,400,000 3,095,067	48,000,000 2,892,387	18,270,000 1,072,658
France...	Under crop, 72,000,000	Census, 1851. 35,781,628	72,000,000 qrs.	2,818,000	7,824,000	32,151,430	4,910,7[illegible]
United States of America... } (Census, 1850.)	Improved . 118,457,622 Unimproved 184,621,348	23,191,918	Wheat . 100,503,899 bush. Rye . 14,188,639 ,, Ind. Corn 592,326,612 ,, Oats . 146,567,879 ,, Barley . 5,167,016 ,, Buckwheat 8,956,916 ,, Peas& Beans 9,219,975 ,, Potatoes 65,796,793 ,, Do. sweet 38,259,196 ,, Rice . 215,312,760 lbs. Tobacco 199,752,646 ,, Cotton . 2,468,624 bales. Wool . 52,789,174 lbs. Flax . 7,715,961 ,, MapleSugar 34,249,886 ,,	4,894,587	18,360,140	21,721,814	30,316,608
Russia...	Under crop, 248,000,000	1850. 66,000,000	180,000,000 qrs.	18,000,000	25,000,000	50,000,000	12,000,000
Prussia	Under crop, 9,012,762	1849. 16,306,685	30,000,000 qrs,	1,565,000	5,042,000	16,236,000	2,115,000
Austria	Under crop, 45,000,000	1851. 36,514,456	64,000,000 qrs.	2,850,000	11,657,000	33,767,000	5,990,436

DISCUSSION.

The SECRETARY read the following statement, which he had received from Mr. H. F. Jadis, the Comptroller of Corn Returns, Board of Trade, who was unable to attend the meeting.

Mr. H. F. JADIS says: "in 1849, the then President of the Board of Trade, Mr. Labouchere, in reply to a question put by Mr. Sanders, said, "There was great difficulty as to the nature of the machinery to be employed." I certainly feel, when so high an authority has admitted the experienced difficulty, that I am open to the charge of presumption in attempting its solution; but as I am aware that many plans have been proposed to obtain agricultural statistics, I too may venture to cast my plan into the general heap, and trust that a grain of wheat may here and there be gathered out of the thousand and one bushels of chaff. It is not a little wonderful, that while almost every interest has its own statistics—and every European one its commercial, and, to a great extent, its agricultural, *this* country alone is in its greatest and most enduring interest unrepresented in the statistical world; or, if represented at all, so inefficiently, as to be of no practical benefit. The only statistics as regards the soil is to be found in the quantities and averages of corn published by the Comptroller of Corn Returns, Board of Trade. There are three modes which might be adopted to collect the information required. 1st. Clerks of Unions; 2nd. Parochial Clergy; 3rd. Paid Inspectors, *specially* appointed. 1. *Union Clerks.*—These would be very efficient, but their duties are already too onerous to expect them to devote much time to another. It must also be remembered, that the "Unions" are not "universal," there being a considerable number of parishes under local and Gilbert's Acts. 2. *The Parochial Clergy.*—This would be so strongly (and justly) opposed by the parties themselves, as entailing duties so foreign to their own, that I only mention it in consequence of some respectable parties having alluded to it. 3. *Paid Inspectors.*—These to be called "Inspectors of Agricultural Statistics," to be under the control of the Board of Trade, *but not to be appointed or paid by it.* They should be men of intelligence, and locally acquainted with the nature of the several farms; and in order to insure this, they should be appointed as our corn inspectors are, by the magistrates in Quarter Sessions assembled, and paid out of the county rates. By being so paid, they will be under the eyes of the magistrates and ratepayers, and can be removed on application to the Board of Trade, for neglect or inefficiency. One farthing per annum per acre, on 29,579,626 acres, the number under the Union, would realise full £30,000 a year, which, at £50 a head, will be ample funds for their payment. This rate cannot be objected to by the landed interest, as they must be materially served by the obtaining these returns with correctness. With regard to the *modus operandi*, I would divide England into districts or circuits. I find there are 595 Unions, and 31 under Local Acts,* making 626 in all, and representing above 30,000,000 acres. This will give about 45,000 acres to each Union. Now, suppose each Inspector took a circuit of about 50,000 acres, he could efficiently perform his duty. The Inspectors to be furnished with a tabular printed form, containing columns for—1. Quantity of (approximated) all kinds of grain. 2. Number of acres under corn crops. 3. Number of acres under green crops. 4. Number under pasturage or meadow. 5. Number of head of cattle. 6. Number of sheep. 7. Quantity of (approximated) hay. 8. Price of cattle and sheep per head. 9. Rent per acre. 10. Amount of rates and taxes per acre. 11. Average of 4lb. loaf per half-year. 12. Average number of labourers per acre. 13. Rate of wages. 14. Nature of soil. The Inspector to deliver to every occupier one of these forms three weeks before Lady day and Michaelmas-day, with directions to fill them up on each of the above days. The Inspector will then collect them within 28 days, consolidate the whole of his district in another printed form, and forward them thus consolidated to the Board of Trade, to be there arranged, and published as soon as possible in the *Gazette*. As the Comptroller of Corn Returns in the Board of Trade has already a good deal of the machinery for this duty, I would propose him as the fit officer to perform this duty. Each county, it must be observed, must be complete in itself; no one circuit must extend beyond the bounds of its county. I have, I fear, at too great a length stated my opinion as to the easiest mode of obtaining agricultural statistics. I have given the subject much consideration, and if I have in any way assisted in the desired object, I shall be amply repaid."

* There are also 31 Unions in addition under Gilbert's Act.

Mr. SAMUEL SIDNEY expressed his regret that he should rise thus early in the proceedings, but, nevertheless, he was extremely anxious to say a few words on the subject. He did not think that any person present at this meeting was likely to differ as to the conclusions which had been arrived at by the author of the paper. It was most desirable, he thought, that it should be known from year to year what the country produced, and what progress it made in agriculture. The pursuit of agriculture was upon a different footing to any other, and it was a fact, with respect to improvements in agriculture, that they had not shown such progression as they would have done had they been brought before the public through the medium of a correct system of agricultural statistics. It was quite clear, therefore, that they ought to be collected by some means or other, but it was most important that they should have a correct system. They knew that the fluctuations in agricultural produce were very considerable,—one month they might have ample supplies; at another time they might be short; and at another there might be a sudden fall. Hence the value which would attach to a system such as he observed ought to be adopted; but it should be borne in mind that the good of the public must be considered. They all knew perfectly well that however useful an undertaking might be, it must be proved to be for the benefit of the public at large as well as for the advantage of those more immediately concerned; and in the present instance they would have to take some trouble to prove that agricultural statistics were not intended to be injurious to the farmers. It had been said that they would furnish a new attempt to reduce the price of corn. The answer he should make to this would be, that the great corn merchants had in their own hands the means of ascertaining the results of a corn harvest, particularly where wheat was concerned; and he was quite sure that if they could place in the possession of the public, shortly after the harvest, returns of the yield, and what they could supply for the rest of the year, they would no longer suffer from famines in the market. At the present moment a great deal of attention was paid to agricultural statistics of a particular kind. The *Mark Lane Express* went to considerable expense in collecting the price of corn in every part of the world; but they had no correct means of knowing what was the comparative progress which had been made in one part of a district over another. In some localities they showed that great progress had been made, whilst in others they gave no such information, because they had no practical proof before their eyes. The manner of collecting the statistics was a matter of considerable importance. He had very little faith in a system which would require that commissioners should be sent round the country to confer with the farmers as to the statistics of their produce. Farmers were a genial race of people, but they had a suspicion of commissioners. Therefore, he thought they must trust to the old and well-tested method which was furnished by the press. They would then achieve their object, by putting before the farmers, in a plain and intelligible way, information, which those who were naturally suspicious of any new scheme would not appreciate if it was proposed by persons of whom they knew nothing. The farmer would say that the landlord could raise his

rent, because, by agricultural statistics, he would find out how much produce his land yielded. It should be recollected that many farm tenancies were only from year to year, and the landlord could turn the farmer out whenever he thought proper. But this was not an argument against agricultural statistics, but against farming on a tenancy from year to year. For his own part, he did not believe there was anything in the argument at all. Another objection which had been raised was one which would be familiar to those persons who knew what farmers' leases were. It was a great misfortune that a great deal of land was managed by lawyers, and not by landlords or their agents; and this, he considered, was an excellent reason for doing away with those absurd covenants which were too often introduced into leases. Mr. Sidney proceeded to say, that whatever plan they adopted it should be a general one—not to be carried out according to the particular character of the landlord. The plan which had been proposed by Mr. Jadis would not do at all; it was exactly like an official plan, and would not be satisfactory to the public. No person who paid county rates would believe that they ought to pay for a process which was essentially national—and therefore the plan should be one which appealed to the public at large. With respect to the persons who should collect the statistics, he would only say it should be some one in whom the farmers had confidence. Let them begin by making friends with the farmers, and by showing them that it was not desired to lower the price of their produce, but to make the most of their land. This might be done without any violent means, and not as against the farmers, but with their co-operation. He was quite sure that they would have no difficulty in carrying out the undertaking, if they proceeded in this spirit,

Mr. Caird said, he thought they must be all agreed that agricultural statistics, in a national point of view, were of the greatest importance, but imagined that if they taxed the farmer for that which was intended as a national benefit, they would set him against them at once. The quantity of grain sold annually in the English market amounted to forty millions of quarters; and if accurate statistics should prevent the fluctuation of prices to the extent of only one shilling a quarter, the sum gained would amount to two millions sterling, which would pay for collecting the agricultural statistics of this country for the next century. He thought, after the paper which had been already read, that it was quite unnecessary to urge the importance of the subject; but he would read to the meeting a plan for collecting the statistics which he had prepared, upon the principle that it would be improper that they should demand of the farmer information as to his private affairs. With regard to the suggestion for sending out commissioners to instruct the farmers how to fill up the returns, he would observe, that during a very extensive experience, he had always met with the greatest civility from farmers, and a desire to give him every information which would be publicly useful and not privately injurious, but he considered such a commission entirely unnecessary. Mr. Caird proceeded to say that the principles on which the system of collecting returns proposed by him was based, were—1. The main object is to obtain trustworthy returns, and these with the least necessary expense. 2. Trustworthy returns can be obtained only through trustworthy officers, responsible for the correct performance of their duty, and working under a system which affords a ready test of accuracy. 3. Economy will be promoted by employing a small number of competent and responsible men, rather than a very numerous body of local officials, each of whom must receive a fee, while they would be comparatively irresponsible, and, from their numbers, subject to no satisfactory test of accuracy. 4. As the returns, to be useful, must be made within a very short time after harvest, and before much of the corn can be thrashed, they must, necessarily, be of the nature of an estimate, in so far as the yield per acre is concerned. 5. It is desirable, for many reasons, that the collection of the returns be made in a manner as little inquisitorial or offensive as possible; if either, they will be apt to fail in their main object, *correctness*. The employment of confidential officers, bound to secresy, will be a guarantee against the use of the returns for any but public purposes. 6. The first point to be ascertained is *the acreage under each different crop*; and this, as will be shown,* is by far the most important part of the inquiry. This will be, not an *estimate*, but a record of *facts*. It is requisite, therefore, that it be conducted with care and deliberation; and, as it may be begun as soon as the seed is sown, the three months of May, June, and July, may be occupied in this part of the inquiry. 7. There can be no reasonable objection on the part of any occupier to an inquiry as to the manner in which the surface of his farm is cropped. That is quite a different question from demanding to know the total produce of his crops. Nor would there be the same objection, on the part of the farmers, to answer such questions when put by a responsible and confidential officer, as by what might be thought a prying and irresponsible neighbour. 8. The varying measures and weights in use throughout the country are a further argument in favour of competently qualified officers, who could personally ascertain the local measures, and convert them into the recognised standard; and this might be made the direct means of introducing, and gradually establishing, a uniform standard of weights and measures. 9. The acreage under each different crop having been ascertained, the occupier would be required to say, not what was the actual produce of a particular field, but the actual produce per acre of each crop on his farm, in ordinary years. 10. *Before harvest* these important facts would thus have been ascertained, viz.;—1st. The extent under each kind of crop. 2nd. The average produce per acre of ordinary years. There would remain to be ascertained *after harvest*, only—3rd. How much the yield of that crop was above or below the average. 11. The effects of good or bad cultivation on each farm having been ascertained by the average produce, it follows that the effects produced by good or bad weather would be all that would remain to be learned after harvest—and, as the effects of weather over a parish would be pretty uniform, a single answer, from a competent judge of light and heavy soils in each parish, would fix this point. An alteration in the average quantity, to the requisite extent, could be made with great facility. 12. It will be necessary that each collector of returns be provided with an accurate Map of the districts committed to him, and a correct list of the occupiers of land in each parish. 13. The Tithe and Inclosure Commission Office is suggested, as it affords a machinery already organised, with competently qualified officers locally employed in every part of Great Britain. This office is also possessed of the most complete system of Maps of the various districts of the country which can at present be had. From these and the ordnance surveys, with local information, a very accurate Map of each county and parish could be compiled. An accurate list of the occu-

* The greater importance of ascertaining accurately *the number of acres under each crop* than the *yield per acre*, is shown by the Statistical Returns of Ireland, which tell us that

In 1849, there were	687,646 acs. of wheat,	yielding	2,148,893 qrs.
In 1852, „	only 353,566	„	1,154,205 „
Decrease in acres,	334,080	In wheat,	994,688 qrs.

But, if the variation above or below average produce had been alone taken, without inquiry, at the same time, as to the proportion of acres under wheat, the returns would have been entirely fallacious, the yield per acre in 1852 having averaged 26 bushels against 25 in 1849. Thus, taking the acreage of 1849, 687,646, and applying to it the average yield of 1852, the returns would be 2,234,849, which would be an error of no less than 1,080,644 quarters beyond the actual produce of 1852. The ascertainment of the area under each crop is thus clearly the most important part of the returns, and this branch, as already mentioned, may be conducted with care and deliberation, as its extends over a period, if necessary, of three months

piers of land would be obtained from the collector of rates in each parish. Taking the foregoing data as the principles on which to conduct the enquiriy, we should proceed thus:—*Plan of operations.* We shall suppose a branch of the Tithe and Inclosure Commission Office, or such other office as the Government may deem most suitable, to be the central office for issuing instructions, controlling officers, inspecting and testing the accuracy of the returns, and for arranging them for publication. One, two, and in some cases, three collectors of returns for each county, according to its extent, would be appointed. These would be selected men of known competence. Each collector would be employed on an average 90 *days before harvest* in ascertaining the acreage under each crop and other particulars—and 10 *days after harvest* in ascertaining the comparative yield of the last crop. The collector, provided with his Map and list of occupiers, would, between the 1st of May and the end of July, personally visit every occupier of land within his district, and mark down in a book the several particulars required to be ascertained. This book would, when completed after harvest, be forwarded to the central office in London, and would be preserved for being afterwards tested by the personal enquiry of a superior officer. Immediately after harvest, the collector would again visit each parish in his district, and satisfy himself as to whether the crop of each kind was an average, or in how far it was above or below an average. Having already calculated the average produce of each crop in a parish, he would alter that to correspond with the actual produce of the particular season. Thus, for example, if he had ascertained that a certain parish had 1500 acres in wheat, which at the rate of the average of years yielded 39,000 bushels, but that the actual yield of that year had proved 2 bushels an acre below the average, he would subtract 3000 bushels from the above quantity, and return 36,000 bushels as the estimated yield of wheat in that parish. The main part of the calculations having been completed before harvest, the alterations necessary after harvest would be made with great facility, and the gross returns of the crops be ready for publication by the 10th of October. Monthly reports of the state of the growing crops at the most critical period, would be made during the three months of enquiry. It would be part of the duty of the central office to test the returns of every collector by an Inspector taking his returns for a particular parish, and investigating on the spot each statement recorded. This should be done in spring, so that the *estimate* might be compared with the *fact* after the crop was thrashed out; and thus any carelessness or gross inaccuracy would be detected, and a useful guide be supplied for the future. Incompetency or carelessness would be visited with loss of employment. After the gross returns of produce were issued, (which would be the first object,) it would be the duty of the Central Office to compile from the returns such valuable statistics as had a special bearing on the agricultural improvement of the kingdom, and of every separate district in it. As to the expense of obtaining the returns, it is obvious that there will be considerable economy in taking advantage of an existing department of government, such as the Tithe and Inclosure Commission, upon which this scheme might be without much difficulty engrafted. The officers employed in the various parts of the country by this department are chiefly occupied at present in the autumn, winter, and spring months, so that the duties of this enquiry would not interfere much with their ordinary duties. For the first year a greater number of persons would be required to organise the system, but in after years the whole cost would certainly not exceed £25,000 per annum. When it is considered that the estimated produce of the United Kingdom in grain of all kinds is 60 million quarters annually, 40 millions of which come upon the market for sale, and that one shilling per quarter of fluctuation in price amounts to £2,000,000 sterling, the cost of collecting accurate information which should limit this fluctuation by only one shilling a quarter, would be repaid one hundred fold. Each year's experience would render these returns more perfect, as all the persons engaged would acquire greater accuracy in every branch of the inquiry.

Dr. WADDILOVE said he had listened with some attention to the paper which had been read by the Secretary; and it appeared to him that no practical benefit could arise from the plan proposed in it. He was only seeking information, and he should be glad to know whether he was not right in saying that no benfit would result from the scheme, unless it could be shown that the produce of the land would be thereby increased. If the object of the statistics was merely intended to improve the prospects of the farmers, he thought it would be unfair to saddle the country with an expense which was merely intended for the advantage of private individuals.

The CHAIRMAN said—the gentleman who had just spoken had rather misunderstood the object of the proposed statistics. It was not directly to improve the management of farms; but the object was, that at as early a period as possible the country might be made aware of the supply it might expect for its own sustenance during the ensuing year, in order that they might make provision for any dificiency. It was not (with this view) so important to ascertain the exact amount of produce as the relative amount. In all these cases it was sufficient to rely upon an approximation to the exact yield. This was all they required, and it was the only result possible, because they could not get any real result until long after the corn was consumed. He could not but think that the suggestions of Mr. Caird and of Mr. Wingrove Cooke would be useful, as it would be sufficient for practical purposes if they could ascertain the probable yield of the coming crops by the number of acres under cultivation. There would be no great difficulty in getting the information they required if they sent down to the Chairman of every Board of Guardians, who would supply them with an account of the number of acres in his particular district, and the extent of yield on the different classes of land at a given period when the corn should be ripe.

Mr. MORTON, as a farmer, felt the necessity for a correct system of agricultural statistics, and stated that, in the year 1847, when the great fluctuations alluded to in the paper had occurred, he was unfortunate enough to sell a large quantity of grain just before the rise in the market took place, and on the prices falling he was again induced to sell. Had he been in possession of, or had the means of obtaining correct information as to the amount of grain on hand and the probable demand, he should not have been exposed to such uncertainty in his proceedings.

Mr. SLANEY said this was one of the most important subjects, both to the farmer and to the people, which could possibly be brought under their notice. It should be recollected that it was owing rather to scarcity and other natural causes, than to anything that could belong to man's doing, that prices were much higher at one time than at another. Therefore, he believed, that, if there were any means of collecting the statistics of agricultural produce, it would tend to diminish discontent with regard to the fluctuation of prices. Some little time ago, being on the Council of the Royal Agricultural Society, he had had the privilege of inspecting the crops on the estate of the late Earl of Ducie, and from what he then witnessed, he was quite convinced that to none would agricultural statistics be of greater benefit than to the great mass of the working classes of this country. In some of the manufacturing towns a number of workmen had combined together for the purpose of purchasing provisions, and they were thus enabled to ascertain that high prices did not arise from any injustice inflicted upon them, but from natural causes. He thought this system might be carried out on a much larger scale, if they were furnished with every species of farm produce in every part of the country.

Mr. Wentworth Dilke, suggested that, as the subject was one of great importance, and as there were several gentlemen present who would be disposed to speak upon it, it would be advisable to adjourn the discussion until Wednesday next. The proposition was agreed to.

PRESENTATION OF THE SWINEY GOBLET.

The Chairman then rose for the purpose of presenting to Mr. Leone Levi, the goblet which had been awarded to him in accordance with the will of the late Dr. Swiney, for his work "On the Commercial Law of the World." His Lordship stated, that Dr. George Swiney, by his will gave 5,000*l.* to the Society of Arts, upon trust, every fifth anniversary of his death, to present to "the author of the best published work on jurisprudence," a silver goblet, value 100*l.*, containing 100 sovereigns. Doctor Swiney died on the 20th June, 1844, and the 20th January last, was the 2nd quinquennial period. The goblet had been exhibited at the New York Exhibition, and had only just been received in this country, or it would have been presented before. It was from a design specially prepared for the Society by Mr. D. Maclise, R.A. His lordship proceeded to observe that, on the former occasion, the prize had been awarded to Dr. Paris, and to Mr. Commissioner Fonblanque, and it was no small merit for his friend Mr. Levi, to have achieved an honor which placed him in the same category with these distinguished persons. Mr. Levi was a foreigner, and had not been many years in England; and it was therefore very remarkable that he should obtain the prize for the best work on jurisprudence. They must have observed the peculiar neatness and felicity with which he had expressed his thoughts in the paper they had just heard read, and when he reminded them that the book he had written was a history of the Commercial Law of the World, and that it contained a digest of the law of a large number of foreign states, they would be able to conceive what a vast amount of industry and intelligence must have been devoted to the accomplishment of the task. He rejoiced in having this opportunity of paying such a tribute to a foreigner, for he could not but hope that they might long cherish the feeling which prompted them to place foreigners upon an equal footing with our own countrymen, in all matters where merit was to be acknowledged and great achievements to be rewarded. He had long had the pleasure of being acquainted with Mr. Levi, and, in presenting this testimonial to him, he could say that he did so with the greatest satisfaction, from the experience he had had, not only of his intellectual powers, but of his private worth.

Mr. Levi, in acknowledging the honour bestowed on him, said, that it was scarcely necessary for him to state how deeply grateful he felt to the members of the Society of Arts, to the members of the College of Physicians, and to his noble friend in the Chair, for such an unexpected and valued testimonial. In the reveries in which he occasionally indulged whilst labouring in the compilation of his work, he did not anticipate that public approbation would be so liberally granted to him; and he felt equally grateful on account of the nature of the gift, the scientific merit, and the eminent character of the donors themselves. The work was a collection of laws, digested and compared. Its object was to simplify the laws which governed commerce in this country, and to render into the English idiom the principles of jurisprudence of other nations. The learned and eminent Lord Mansfield did not consider it derogatory to British jurisprudence to borrow whatever was good, either from the Civil Law, the Law of Nations, or the Maritime Law of any country with which he was conversant. Another leading object of the work was, the assimilation of the Mercantile Law of the United Kingdom. Countries united by indissoluble ties of friendship, commerce, and religion, and forming one integral state, should have one system of law for the whole territory. And it aimed still further to extend the principle of assimilation to the laws of all countries, judging that, gradually as the relations of friendship and commerce enlarged with any country, it would be important to remove the obstructions which arose from different and often conflicting systems of jurisprudence. The Statistical Chart attached to the work showed the economical state of all countries; and there, also, he found it impossible to compare the relative progress of nations, owing to the different times at which the statistics were taken in the several countries. He was glad to find that the work was productive of good. The importance of assimilating the Mercantile Law of the United Kingdom was acknowledged by the commercial world; and, upon a Conference having been held of Deputies from all the Chambers of Commerce, a Royal Commission was issued, which was now discussing the various subjects, and several Bills were also before Parliament for the purpose of assimilating the Mercantile Laws of England and Scotland. A great Statistical Congress had also been held at Brussels, in October last, with a view to introduce unity into the statistical documents of all countries. Mr. Levi then stated how much he was indebted to Lord Harrowby for his kindness in affording him at all times counsel and assistance, and he heartily thanked his lordship for such continued and highly valued countenance. He was also much indebted to the Liverpool Chamber of Commerce, an institution with the foundation of which he had the honour of being identified, for the early steps taken by them in procuring information from other countries for his work, and to Mr. James Stitt, of that town, for his friendship from the first day he put foot on British ground, now nearly ten years since. Similar acknowledgments were also due to the Chambers of Commerce of Leeds, Bradford, Hull, and Edinburgh, for the support they had given him; and also to the Sovereigns of Austria and Prussia, who had lately honoured him with their gold medals. He would gratefully acknowledge the countenance received from his Excellency Chevalier Bunsen, one so eminent in letters and science, and to the public at large, for the kindness he had uniformly received. Though a naturalised British subject, he was an Italian by birth, and the honour now conferred on him by the Society was an honour to Italy, which had produced so many bright luminaries in the legal world, and to his native town (Ancona), which had given the first writer on international law, Alberico Gentilis, one who filled the chair of civil law at Oxford in the sixteenth century.

The Secretary announced that at the meeting of Wednesday next, the 5th of April, the discussion "On Agricultural Statistics" would be resumed.

EDUCATIONAL APPARATUS EXHIBITION.

The following letter and despatch in reference to this Exhibition has been received from the Foreign Office:—

Foreign Office, March 20th, 1854.

Sir,—With reference to my letter of the 6th ultimo, stating that the Earl of Clarendon would, in compliance with the request of the Council of the Society of Arts, request the co-operation of foreign Governments with respect to the Educational Exhibition proposed to be held in June next, I am directed by his Lordship to transmit to you a copy of a note which Lord Cowley, her Majesty's ambassador at Paris, has received from the French Minister for Foreign Affairs, upon the subject of the proposed Exhibition.

I am, Sir,
Your most obedient humble Servant,
(Signed) H. U. ADDINGTON.

"The Secretary to the Society of Arts."

M. L'Ambassadeur,—V. E. m'a fait l'honneur de me transmettre, le 8 du mois dernier, une lettre adressée

par la Société Britannique des Arts à Lord Clarendon, au sujet d'une exposition de tout ce qui se rattache à l'education, qui doit avoir lieu à Londres, au mois de Juin prochain. V. E. m'a exprimé, en même temps, au nom de votre Gouvernement, le desir de recevoir divers renseignemens et documens relatifs à l'instruction publique en France.

Je me suis empressé, M. l'Ambassadeur, de communiquer cette demande à M. le Ministre de l'Instruction Publique et des Cultes, en la recommandant à son attention particulière; et j'aurai soin de mettre ultérieurement à la disposition de V. E. tous les élémens d'information que M. Fortoul m'aura fait parvenir sur les points indiqués dans la lettre de V. E.

Agréez, &c.,

(Signed) DROUYN DE L'HUYS.

Paris, le 1 Mars, 1854.

ON THE ELECTRO-PLATING OF METALLIC ARTICLES WITH WHITE METALS, ALUMINIUM AND SILICIUM, FROM CLAY, STONE, AND SAND.

By G. Gore, M.D.

It has long been known to chemists that all kinds of clay, stone, and sand, of which the crust of the earth is composed, consist of metals combined with oxygen, carbonic acid, sulphuric acid, and other non-metallic elements, forming therewith oxides, carbonates, sulphates, &c.; thus clay is an oxide of aluminium, sand an oxide of silicium, limestone a carbonate of calcium. But the separation of the metallic bases from the non-metallic elements with which they are combined, has been a matter of so great difficulty, that but few chemists have put themselves to the trouble of accomplishing it, and those who have done so have made use of the most powerful means and reducing agents, such as large voltaic batteries, potassium, &c., and have then obtained them in a state of alloy or combination with mercury. Sir Humphrey Davy, the discoverer of most of these bases, in his experiments on the decomposition of the alkalies and earths, used a powerful battery, consisting of 500 pairs of plates, and then succeeded in obtaining them combined with mercury, from which they were afterwards separated; Wohler and Berzelius, in their discoveries of the means of separating the metals aluminium and silicium from their respective compounds, clay and sand, used a high temperature and potassium, and then succeeded in obtaining them in the condition of dull metallic powders, nearly invisible.

By a means recently discovered, and described in the March number of the "Philosophical Magazine" for this year, I have succeeded in depositing the metals aluminium from clay, and silicium from sand stone, each in a perfect metallic condition, by dissolving pipe-clay, common red sand, pounded stone, &c., in various chemical liquids, and passing currents of electricity from ordinary small voltaic batteries through the solutions.

My attention has since been directed to produce simple processes, whereby any person not possessing a knowledge of chemistry may readily coat articles with those metals, and cause the discovery to be immediately applied to human benefit in the arts and manufactures, and the following are the results of my experiments:—

To coat articles of copper, brass, or German silver, with aluminium, take equal measures of sulphuric acid and water, or take one measure each of sulphuric and hydrochloric acids and two measures of water; add to the water a small quantity of pipe-clay, in the proportion of five or ten grains by weight to every ounce by measure of water (or ½ oz. to the pint), rub the clay with the water until the two are perfectly mixed, then add the acid to the clay solution, and boil the mixture in a covered glass vessel one hour. Allow the liquid to settle, take the clear, supernatant solution, while hot, and immerse in it an earthern porous cell, containing a mixture of one measure of sulphuric acid and ten measures of water, together with a rod or plate of amalgamated zinc; take a small Smee's battery, of three or four pairs of plates, connected together intensity fashion, and connect its positive pole by a wire, with the piece of zinc in the porous cell. Having perfectly cleaned the surface of the article to be coated, connect it by a wire with the negative pole of the battery, and immerse it in the hot clay solution; immediately abundance of gas will be evolved from the whole of the immersed surface of the article, and in a few minutes, if the size of the article is adapted to the quantity of the current of electricity passing through it, a fine white deposit of aluminium will appear all over its surface. It may then be taken out, washed quickly in clean water, and wiped dry, and polished; but, if a thicker coating is required, it must be taken out when the deposit becomes dull in appearance, washed, dried, polished, and re-immersed; and this must be repeated at intervals, as often as it becomes dull, until the required thickness is obtained. With small articles it is not absolutely necessary, either in this or the following process, that a separate battery be employed, as the article to be coated may be connected by a wire with the piece of zinc in the porous cell, and immersed in the outer liquid, when it will receive a deposit, but more slowly than when a battery is employed.

To coat articles with Silicium. Take the following proportions: three-quarters of an ounce, by measure, of hydrofluoric acid, a quarter of an ounce of hydrochloric acid, and forty or fifty grains either of precipitated silica or of fine white sand, (the former dissolves most freely), and boil the whole together a few minutes, until no more silica is dissolved. Use this solution exactly in the same manner as the clay solution, and a fine white deposit of metallic silicium will be obtained, provided the size of the article is adapted to the quantity of the electric current; common red sand, or indeed any kind of silicious stone, finely powdered, may be used in place of the white sand, and with equal success, if it be previously boiled in hydrochloric acid, to remove the red oxide of iron or other impurities.

Both in depositing aluminium and silicium, it is necessary to well saturate the acids with the solid ingredients by boiling, otherwise very little deposit of metal will be obtained.

Among the many experiments I have made upon this subject, the following are a few of the most interesting:—

Experiment 1. Boiled some pipe-clay in caustic potash and water, poured the clear part of the solution into a glass vessel and immersed in it a small earthen porous cell, containing dilute sulphuric acid and a piece of amalgamated zinc; immersed a similar piece of bright sheet copper in the alkaline liquid, and connected it with the negative pole of a small Smee's battery of three pairs of plates, connected the zinc plate with the positive pole, and let the whole stand undisturbed all night; on examining it next morning I found the piece of copper coated with a white silver-like deposit of metallic aluminium.

Experiment 2. Obtained from a railway cutting in the town, a small piece of the sand rock upon which Birmingham is built, boiled it in hydrochloric acid, to remove the red oxide of iron, washed it clean with water, and dissolved it by boiling in a mixture of hydrofluoric acid, nitric acid, and water; immersed in this solution, a porous cell with dilute acid and zinc, as before; connected a piece of brass with the zinc by a wire, and suspended it in the outer liquid, which was kept hot by means of a small spirit lamp beneath; after allowing the action to proceed several hours, I found the piece of brass beautifully coated with white metallic silicium.

Experiment 3. Took one part, by weight, of the same sand stone, after being purified by the hydrochloric acid, and 2½ parts of carbonate of potash, fused them together in a crucible until all evolution of gas ceased, and a perfect glass was formed; poured out the melted glass, and when cold dissolved it in water, and used this solution in

the same manner as the former ones, allowing the action to proceed about twelve hours, when a good white deposit of metallic silicium was obtained.

Experiment 4. Took some stones with which the streets of Birmingham are macadamised, pounded them fine in a mortar, boiled the powder in hydrochloric acid, to purify it from iron, washed it well in water, and dissolved it by boiling an excess of it in a mixture of ½ oz., by measure, of hydro-fluoric acid, ½ oz. of water, and ¼ oz each of nitre and hydro-chloric acids, until no more would dissolve; used the clear portion of this solution in the same manner as the former liquids, and readily coated in it a piece of brass with a beautifully white deposit either of aluminium or silicium.

From these and many other experiments which I have tried, it is quite clear that common metal articles may be readily coated with white metals, possessing similar characters to silver, from solutions of the most common and abundant materials, and thus bring within the purchase of the poorer classes articles of taste and cleanliness which are at present only to be obtained by the comparatively wealthy.

The following specimens accompany the communication, and may be seen at the Society's house:—

1st. One specimen each of sheet copper and brass, coated with aluminium from "Pipe-clay," according to process described.

2nd. One specimen each of sheet copper and brass, coated with silicium, from silica and sand, according to process described.

3rd. Specimen of Birmingham sand rock.

4th. Specimen of ditto, purified by hydro-chloric acid.

5th. Specimen of sheet metal coated with silicium from Birmingham sand-stone.

6th. Specimen of road stone with which Birmingham streets are macadamized.

7th. Ditto, in a state of powder.

8th. Ditto, purified by hydrochloric acid.

9th. Specimen of sheet brass coated with silicium from this road stone.

Birmingham, 24th March, 1854.

ON REFORMATORY AND INDUSTRIAL SCHOOLS FOR VAGRANT CHILDREN.

BY J. C. BUCKMASTER.

[*Concluded from p. 325.*]

Many objections may be urged against sending a boy to work for three or four hours before sending him to school. The business of the school should always precede the labour of the field; the nervous energy is exhausted by physical exertion, and the boy is unfitted for the instruction of the schoolmaster;—a kind of lethargy comes over him, and he feels more disposed for sleep than study. I think the experience of all who have had anything to do with Industrial Schools will bear out the truth of this statement. A routine for the general management of such a school as I have proposed, might perhaps be very well arranged as follows:

MORNING. o'clock.		AFTERNOON. o'clock.	
5½	Rise, wash, and dress.	1	Both divisions go to work.
6	Prayers.	4½	Return home.
6½	Drill.	5	Supper and leisure.
7	Breakfast.	8	Prayers.
7½	Senior division go to work, junior division to school.	8½	Bed.
12	Dinner.		

In winter, this routine would require some alteration, but, as a general rule, I think it might be acted upon with success. Prayers should be read every day by the governor. The boys should be carefully instructed in the principles of the established religion, and on Sunday they should attend the nearest parish church. A resident chaplain would be a great blessing, but such an officer could not be obtained without an additional expense of £150 or £200 a year. The governor and schoolmaster and every officer on the establishment, should supply, as far as possible, the deficiency, and if the right sort of men were selected, I should have no doubt as to the success of the school. The cost of such an establishment is insignificant compared with the great moral and social good likely to result from it. Instead of spending millions of public money in punishing criminal children, let us try what can be done towards preventing them from becoming criminals. There is no economy in allowing boys to commit crime, and then making expensive and abortive efforts at their reformation. A magistrate hesitates before he sends a child to prison, because he knows it will probably come out worse than it went in. There are no adequate means to counteract the demoralizing influences of a prison life. Here, at our very doors, lurking about our streets and alleys, to beg or to steal, we have a vagrant juvenile population of thousands, who know nothing of religion, and who are not possessed of the commonest rudiments of education, to remove the gross ignorance which envelopes them like a cloud, cuts them off from all association with their better-taught fellow-creatures, which almost necessitates that they should either beg or steal, or else not live, and which obscures their perceptions till they sink from poverty and crime into the grave, into which they fall without thinking or feeling that its gloomy portals admit them to an everlasting futurity which this life was given them to prepare for. Nothing can be more merciful or expedient than some such plan as I have endeavoured to explain. Let vagrant children be treated as children; let them be placed under early control and trained to habits of industry and self-reliance. The increase of juvenile criminals is fraught with great danger to the institutions of our country, and there is no social question of the present day upon which the philanthropist can better bestow his attention. The lodging house, the beer shop, the public house, the singing saloon, the penny hop, and the penny gaff, are the schools in which hundreds of children are trained to the commission of crime, and familiarised with all sorts of vice and immorality. In Manchester alone there are forty-three thousand children of the working classes, neither at school nor at work; and in other towns we find equally large numbers in the same neglected condition. Our success as a nation depends chiefly upon the morality and industry of our population; but there are elements at work upon the children of the working classes, which threatens to destroy the national character of our workpeople. I am not anxious to raise the cry of alarm without a cause, but an intimate political connexion with a large number of the working classes for several years has enabled me in some measure to form an opinion on this subject. We want better fathers, and better mothers, and it is to sanitary measures, and an enlightened but compulsory system of national education that our hopes must be directed. The great bulk of our labouring population are lamentably ignorant. Their ignorance renders them the easy dupes of demagogues and knaves, and where any education exists it is of such a kind that it affords them no assistance in the daily avocations of life, nor does it protect them against the snares into which they are most liable to fall. For the present I shall conclude these remarks by the following extract from the *Irish Quarterly*:—"None can doubt that the success or the failure of the important questions of Prison Discipline and of Reformatory Schools, depend entirely upon the people of these kingdoms. All efforts must fail of success unless the nation will learn that to teach God's law to a poor child criminal, or a neglected child who may become criminal, is cheaper than to leave him to learn man's law from a judge and the devil's code from his fellow prisoners."

INFLUENCE OF OCCUPATION UPON HEALTH.

An interesting report has been prepared by Mr. Finlaison, the actuary of the National Debt-office, upon the subject of sickness and mortality among the male members of friendly societies in England and Wales, as shown by the returns made by them to the Government for the five years 1846—1850. It appears that the proportion on the sick list in the course of a year is one in four, or 24·99 in every 100. The proportion seems large, but some allowance may have to be made for cases of feigned illness, and the persons in question are not those who are most favourably circumstanced in regard to food, clothing, lodging, and the various conditions of health. Mr. Finlaison proceeds to divide the members of these societies into four classes:—1, those who have heavy labour, with exposure to the weather, such as agricultural and other outdoor labourers—a class in which he has 353,103 cases; 2, those who have heavy labour without exposure to the weather—such as smiths, sawyers, coopers, plumbers—a class numbering 94,259; 3, those who have light labour, with exposure to the weather, such as shepherds, drovers, drivers, pedlars, messengers, Custom-house officers—in number, 58,709; 4, those who have light labour, without exposure to the whether, such as clerks, shopmen, barbers, factory operatives, servants—in number, 286,909. He found that persons engaged in heavy labour, with and without exposnre to the weather, have respectively 28·04 and 26·54 per cent. of their number sick in the year; persons engaged in light labour, 20 80 and 21·58. In round numbers, taking a census of working men disabled by illness, for every three whose work is light or moderate there are four of the class whose lot is heavy labour. The duration of sickness to each person sick is, however, upon an average, only 38 days and 40·73 in the two classes engaged in heavy labour, and 41 days and 44 25 in the two classes engaged in light labour. The mortality is heaviest among the persons classed as engaged in light labour; and indoor work shows itself less favourable to longevity than outdoor. But the main difference in the distribution of sickness seems to turn upon the expenditure of physical force. "This is no new thing," says Mr. Finlaison, "for in all ages the enervation and decrepitude of the bodily frame has been observed to follow a prodigal waste of the mental or corporeal energies; but it has been nowhere previously established upon recorded experience, that the *quantum* of sickness annually falling to the lot of man is in direct proportion to the demands on his muscular power. So it would seem to be, however. Therefore, whatever scientific invention of machinery to save the expenditure of bodily strength may be devised, its production should be hailed as one of the greatest of blessings to the sons of toil, and not ignorantly contemned by the very class whom in reality it ultimately benefits. A study of the following digest leads to the conclusion, that the inventor of any engine which spares the physical energies diminishes the amount of human sickness in proportion as he, by means of his device, economises the labour of his fellow creatures." The tables show that the liability to sickness runs up to a temporary *maximum* in the young man, and then declines, and does not attain the same per centage until advanced years. This sick *maximum* of early manhood—the effect of a premature demand on the bodily vigour—is in the period from 18 to 21, except in the class engaged in outdoor heavy labour, in which it appears to be at 14. The same per centage is reached, ever afterwards to increase, at the age of 48 in the class who have indoor heavy labour, 51 in the case of indoor light labour, 57 with outdoor heavy labour, and 65 with outdoor light labour. These last remarks relate to the proportion of persons sick, not to the duration of the sickness. The duration of sickness does not decline in manhood, but increases with the age. The severity of railway employment, according to these tables, tells upon the constitution; the men, it is said, get "weather beaten." In the police there is a marked increase in the amount of sickness after 40.

IMPROVED JACQURD MACHINE.

At the Institution of Civil Engineers on Tuesday week a Paper was read, Descriptive of "Martin's Improved Jacquard Machine," by Mr. Edward Laforest.

After stating the very general application of Jacquard Machines to all ornamental weaving, the Paper described the old machine, and the manner in which the patterns were produced, by means of bands of punched cards, acting on needles, with loops, or eyes, which regulated the figure. It showed, also, the great wear and tear to which these cards were subjected; indeed, so much, that for the carpet trade they were often required to be made of sheet iron.

In Martin's new Jacquard Machine the object has been to substitute for the heavy cards a sheet of prepared paper, punched with given apertures, like the cards of the old machines, but instead of being a series of pieces 2½ inches wide, laced together, the punched paper formed a continuous band, only ⅝ of an inch wide, thus so diminishing the bulk that the weight of the new band, as compared with that of the old cards, was in the proportion of 1 to 11.

The method by which this desirable result had been attained was explained to be chiefly by an arrangement, which permitted the four hundred spiral springs on the needles, used in the old machine, to be dispensed with, when, as a consequence, the force and wear and tear due to their resistance would be done away with, and fine and light wires could be made to do the work of strong and heavy ones.

In order to render this clear, one of Martin's machines with a part of an old machine, and bands of equal numbers of cards, under each system, were exhibited.

The next point demonstrated was, that, like the bulk and weight, the cost of the cards, under the new system, would be greatly reduced.

It was shewn, that by an improved system of punching machinery, the bands could be cut from a design, previously perforated, at the rate of 3000 cards per hour, and any number of duplicates could be produced with equal celerity; it was also stated, that by these means, when a pattern became fashionable, any number of looms might be set to work on it, in about as many days as it had previously required weeks, under the old system. The price of the old cards was 6s. 9d. to 8s. 6d., and upwards, per 100, for new sets, and 5s. 6d. for recuts; whereas the new paper bands would cost 1s. per 100, and 6d. per 100 for recuts. The comparison of cost of 3,000 cards (an average band) would, therefore stand thus:—

	Cost £	s.	d.	Weight.	Length.
3,000 cards at 6s. 9d. per 100.	10	2	6.	. 90lbs.	. . 600ft.
3,000 new bands at 1s per 100.	1	10	0.	. . 8¼lbs.	. 63ft. 9in.

In reference to durability it was stated, that a band had been in constant work for two years, although used on a heavy waiscoat piece.

VILLAGE LIBRARIES.

An important meeting in connection with the Yorkshire Union Village Library Scheme was held on Friday, March 17th, under the management of the Committee of the Topcliffe Literary Institute. Mr. James Hole, secretary of the Yorkshire Union of Mechanics' Institutes, and Mr. Campbell, the librarian, attended as a deputation from the central committee. The meeting was presided over by the Hon. and Very Rev. the Dean of Ripon. Mr. Hole explained that the committee of the Yorkshire Union had found that whilst Mechanics' and other Literary Institutes had been established in all the large, and in most of the small, market towns and larger villages, there were many places where the population was too small to sustain a regular institute with all the appliances of the more populous places, but that, nevertheless, there existed in many such places a desire to share in the advantages of literary societies. The Committee had therefore made

an appeal, which had been well responded to, so that they had been enabled to lend many places books; but as these places were all wide of one another, they were anxious to try the plan in a more systematic manner, and it became a question with them, what district of Yorkshire was the most favourable for the experiment. The committee decided that it should be in an agricultural one, partly because it was felt that the manufacturing villages being more populous, many of them could sustain their Mechanics' Institute, but more especially that the plan should at first be carried out in the Ripon district, where there were numerous villages conveniently situated to act in union. It was proposed to make Topcliffe the centre of a district, with Dishforth, Helperby, Carlton, Sand Hutton, Rainton, Baldersby, and Skipton attached; and Kirklington the centre of another district. The central committee had had made a number of suitable boxes that answered the purpose of a box for transmitting the books, as well as of a bookcase for keeping them at each station. These boxes would, in the first instance, be sent direct from the central library to the villages applying for them, on any place obtaining twenty-five subscribers, but the villages would afterwards receive them every six months from the district secretaries at Topcliffe and Kirklington, with the object of saving expense in carriage. One penny a week, or one shilling a quarter, was all that was asked, and for every twenty-five subscribers fifty volumes would be sent, and exchanged with entirely different books every six months. The Hon. and Very Rev. the Dean of Ripon urged upon the meeting the importance of giving this plan of the village libraries their most cordial and active support, as it would be both a blessing and a credit to them, and offer up a new era in their social existence. The Rev. John Prior, rector of Kirklington, gave some account of the manner in which the plan had been responded to in his village and district, and stated that they had already received two sections of books. Mr. Thomas Copley, district secretary of the Topcliffe associated villages, explained what had been done towards the introduction of the plan amongst the places he had visited. Topcliffe was prepared at once to take two sections of books, which would be issued to the members of their institute without any charge beyond the institute subscription. Addresses were subsequently delivered by Mr. Campbell, Mr. W. Williamson, Mr. Norman, and others.

Home Correspondence.

THE ROYAL COMMISSION AND THE SURPLUS.

Sir,—It is surely high time that the Society and the public should know what the Royal Commissioners are doing up at Kensington-gore with the shilling surplus of the Great Exhibition. It is a long time since we have heard more of them than is conveyed through the formal announcements of the *Court Circular*—that they met, and that such and such members were present. As their meetings are generally held at Westminster, are we at liberty to conclude that the inconvenience of the site which they have selected is already experienced; or does the gingerbread architecture of the Houses of Parliament engage their attention, that they may reproduce it when they begin to build; or are they studying the laws of ventilation; or watching the progress of the Eastern question; or making interest with members for a supplemental grant to buy the rest of the land they want before they commence operations?

We surely are entitled to know what they are doing, and, if they are doing nothing, we might be told what mighty projects are in their minds, to which they cannot give birth after so many months of gestation. The Society, in the Council of which the scheme of the Great Exhibition originated, has not been well treated by the Commission, and I do hope that we may be able to take a spirited revenge upon that stately body, by keeping its duties, its opportunities, and its sins of omission and commission steadily before it. What is it going to do now that it has sunk all its money in land? Does it expect the soil of Kensington, by a spontaneous effort, to produce museums and lecture-halls and galleries—that a university for "the knowledge of common things," and homes for the learned societies, are to spring up from the ground, when, in harlequin fashion, it waves its wand? "I expects I growed," said Topsy, when asked who made her; but the promised institutions of the West-end cannot be created so conveniently, and I want to know where the Commissioners are to get the money. The Chancellor of the Exchequer will button up his pockets and pull tight his purse-strings if they venture to approach him. The House of Commons are not likely to have much consideration either for science or art for some time to come; unless, indeed, Messrs. Cole and Playfair could help our Napiers and Raglans to beat the Russians. The public have taken their spare cash to the shop down at Sydenham; and, to speak the honest truth, in homely phraseology, the Commission is in a regular hole, from which there seems no means of escape. I believe the intentions of its members are excellent, but the world very properly looks at the acts of public bodies, and the more distinguished they are the more it expects. Who could suppose that so many wise heads would commit the blunder of spending all their money in the purchase of land—that they should fasten upon it with such eagerness as to sacrifice everything else in obtaining it—and that they should reduce themselves to the miserable position of proprietors without capital for the useful occupation of their property. It would not surprise me if we had to get an Encumbered Estates' Act for Kensington-gore—if we had to ask Parliament to interfere in rescuing the Commission from the consequences of its own folly. In fact, the Commissioners may be said to have already deliberately put themselves in that position; for they cannot take another step without a grant of the public money. They have gone to work like young spendthrifts, relying upon their rich old aunt down in Westminster, who, for the credit of the family, would not see them brought to the sponging house; or like "the boy Jones," who, when his eccentricities on land were put a stop to, on board ship one day, after first lustily shouting out "Man overboard," jumped into the sea that he might enjoy the luxury of being saved from drowning. They say "we can always sell the land for what we have paid for it." Let them try to do so, and they will find that everybody, even to "the disinterested" Mr. Kelk, will be ready to "bleed" them. That comes of having money which, as it were, belongs to nobody. Blackstone devotes a portion of his Commentaries to explain the rights to "treasure trove," "*jetsam*," "*flotsam*," the carcases of whales cast ashore, and other knotty points in the law of property. I wish he or some other learned pundit had laid down authoritatively what should be done with such sums as the shilling surplus of 1851. It surely would not have been recommended to illustrate therewith the parable of the man who buried his talent in the earth. That the commission have done so, cannot, I think, be disputed. Where were they when Mr. Dargan, single-handed, was getting up the Dublin Exhibition. Did they hasten to render their assistance to this generous and patriotic man? Did they open up and maintain a friendly correspondence with the Irish Committee? Did they use their influence, which could be done cheaply, to help the undertaking? Did they even set the example of exhibiting? It is well known that they did nothing;—that the Prince and Lord Granville were the only members of the commission, who displayed a worthy interest on the occasion; and that, though a direct application was made for the magnificent series of works officially published in connexion with the Exhibition in Hyde-park, they were refused, and only shown indirectly at Merrion-square through the Royal Dublin Society.

Take, again, the Sydenham Palace—what has the Commission done, or what does it contemplate doing for that? Nothing, but harm and injury, though I do not say that these are inflicted intentionally. Whatever may be asserted to the contrary, the public regard the promised institution at Gore House as an unfair opposition to Sydenham. They consider that the Crystal Palace Company, having established its enterprise on a commercial basis, and so far gone on hopefully and prosperously, ought not to be exposed to the disadvantage of competition with a body, composed of all the greatest names in the state, and starting with such a windfall as the shilling surplus. It will be said that this is not a rival scheme—that in building on the ruins of the Symposium, the Royal Commission do not intend to hang up in front of their new premises, the usual flaring announcement, "No connexion with the shop over the way." No, one, however, is deceived by such *representations*, and manufacturers, wise in their generation, are at this moment holding back from the Crystal Palace, because they see "two strings to their bow." I say, that instead of thus perilling the success of the Sydenham undertaking, already sufficiently endangered by internal difficulties, the Royal Commission ought to take an active interest in its welfare, remembering that after spending a million of money in a grand experiment, if that experiment fails, many years must elapse before the improvement of popular tastes upon a self-supporting basis is again attempted.

Lastly, I would ask, as a member of the Society, what the Royal Commission has done for any of those objects which during the last three years we have been engaged in promoting? Has it conferred, either on the Society or on the Institutions connected with it, a single important benefit? Will it help us in our efforts to improve education? Will it even aid us, in this Centenary Session, in getting premises suitable to our increased wants and usefulness. One advantage of the Society's Journal is, that through its columns bodies like the Royal Commission, which are too stately to be useful, may be told the truth. Corporations, we are told, have no conscience, but truth finds them out notwithstanding; and as the albatross was hung round the neck of the ancient mariner, who shot him "with his cross-bow," so "the shilling surplus of the people," unless some "change" be got out of it, will hang for many a day as a reproach on certain great reputations.

DELTA.

CHARCOAL RESPIRATORS.

Sir,—Since reading a paper descriptive of charcoal respirators about a month ago before the Society of Arts, I have ascertained that ordinary wood charcoal is even more efficacious, as an absorbent and oxidizer of vapourous substances than animal charcoal.

Some parties are, I understand, disposed to question the accuracy of my statements, viz; 1stly. That charcoal has the power of absorbing and condensing oxygen within its pores; and 2ndly, that it greatly facilitates the oxidation of many easily alterable substances, organic and inorganic. —I would request the attention of such individuals to the following short extracts from the sixth edition of Brande's Manual of Chemistry, at page 446, where it is stated, on the authority of M. Theodore de Saussure, that wood-charcoal absorbs 925 times its volume of oxygen gas. In an immediately succeeding paragraph the following passage also occurs:—"A piece of well-burned charcoal, cooled under mercury and then introduced into a mixture of oxygen and sulphuretted hydrogen gases rapidly absorbed them, and then became ignited, and caused explosion. (A. Taylor.)" I have repeated Dr. A. Taylor's experiment with a slight variation.—A bit of newly-burned wood charcoal was passed up into dry ammoniacal gas, a large quantity of which it rapidly absorbed.

The charcoal was then introduced into a jar of oxygen. Intense chemical action immediately ensued, much heat was evolved, a quantity of water was produced, and the oxygen disappeared. After these statements I think no reasonable doubt should be entertained either as to the power of charcoal to absorb and condense oxygen within its pores, or as to its efficacy in facilitating the oxidation of easily alterable substances.

I remain, your obedient servant,
JOHN STENHOUSE.

St. Bartholomew's Hospital, March 28th, 1854.

Proceedings of Institutions.

BATTERSEA.—Mr. C. Charles delivered his second lecture on Burlesque, at the Literary and Scientific Institute, on Tuesday evening, having given the first on the 21st ult. In entering on his subject, the lecturer intimated that burlesque was not identical with the ridiculous; but, unlike the latter, it had its legitimate restrictions. Shakspeare's burlesque, he considered, exemplified more by characterization, and the burlesque of the present day more by caricature. He cited instances of real and unintententional burlesque in more worlds than the world of letters; and remarked upon the good and ill results attending its use and abuse. He stated that burlesque, in its censorial capacity, should always sustain its good humour, as well as its wit and humour; and, further, urged the exercise of more good humour in the business of life itself, deprecating all affectations of gravity. He extolled the moral and *medical* virtues of mirth, when it did not "outsport discretion"—advocated cheerfulness in all things, as the mainstay of all social affections—and recommended the expulsion of all austerity from the school-room. In the multiform illustration of his subject, Mr. Charles exhibited surprising aptitude, versatility, and skill in vocal transition. He has a clear musical voice, which was tastefully displayed in his parodies. He adapted imitations of popular comedians and of humorous brogues, with a felicity not common to such pretensions. The illustrations were free from buffoonery, but a vein of characteristic humour was imparted to them, which elicited expressions of approbation.

HIGHGATE.—The annual meeting of the members of the Literary and Scientific Institution was held on Wednesday, the 8th of March. The report of the Committee of Management stated that there was now a total number of 207 subscribers, including 9 life and honorary members, 114 annual members, and 84 associates; the annual members pay one guinea, the associates some ten and some five shillings per annum. The management of the Institution is vested exclusively in the members, but, with this exception, the associates have all the privileges of members. The number of volumes in the Library at the close of the year was 2990; the circulation of the year had been 3,970 volumes. The treasurer's statment of Receipts and Expenditure was highly satisfactory; the receipts had been £216 7s., so that a balance of £24 9s. 7d., due to the treasurer at last audit, had been repaid. The following lectures, &c., were delivered during the year:—Mr. T. C. Bakewell, "On the Electric Telegraph;" Rev. A. Barrett, M.A., "On the Unity of the Human Race, and the development of Language;" Sir John Bowring, LL.D., "On China;" Professor Carpenter, M.D., "On the Relation of Instinct to Reason;" Rev. W. H. Carr, M.A., "Where are our Dramatists;" Rev. Derwent Coleridge, M.A., "On Poetry;" Mr. L. Gisborne, C.E., "On the Canal across the Isthmus of Darien;" Rev. R. Gleig, M.A., "On the Duke of Wellington;" Dr. Latham, F.R.S., "On the Distribution of Languages;" Mr. Geo, Scharf, "On Classic Architecture;" Mr. James Yates. M.A., "On the Barrier Walls of the Roman Empire." (The foregoing Lectures were gratuitous.) Mr. W. Hughes, F.R.G.S., "On Physicial Geography;" (Four Lectures.) Musical Entertainment—"An evening with Thomas Hood," by Mr. Parsons.

KELVEDON.—The third annual meeting of the Literary Institution was held on Friday week. Mr. T. B. Western presided, and opening the proceedings with some remarks upon the flourishing condition and favourable prospects of the institution; expressing a hope that all those who had the ability to do so, would encourage such institutions, as well calculated to afford useful information to those who stood most need of it. Having for several years been Chairman at Quarter Sessions held in a neighbouring county, he could speak from experience that for the most part the criminals brought under his notice could neither read nor write, showing that ignorance is the high road to crime, and offering a strong inducement for all to exert themselves in bringing about a better state of things. The Honorary Secretary (Mr. E. G. Varenne) then gave a report of the past year's proceedings, congratulating the members upon the fact that their institution, apparently so weakly in the early period of its existence, had reached its fourth year, and now appeared to be growing up in a robust and flourishing condition, with an increased number of members, and a more satisfactory financial position. He expressed regret at the breaking up of the Kelvedon Mutual Instruction Society, which, during its existence, had been of great service in the parish, but was glad its members had united with those of the Literary Institution. After some general observations upon education, the secretary gave a detail of the lectures delivered, and read the financial statement, which showed a small balance in hand. Mr. J. J. Mechi President of the Society, moved the adoption of the report, observing that there existed an urgent necessity for the greater diffusion of useful and scientific knowledge; and unless it were supplied we should be quickly superseded by foreigners in many branches of our industrial pursuits. He was happy to say Kelvedon could boast of her machine-makers and carvers of wood; and he hoped that others would endeavour to excel in their several callings. Mr. Crane seconded the motion, and spoke of the good done by the lower class of schools in Kelvedon.

PEMBROKE.—The public meetings for the present year of the Dock Mechanics' Institute were commenced on the 29th of January, with an amateur concert, which proved very successful. On the 7th inst. the Rev. Josephus Williams delivered his second lecture, "On Water, as the medium by which the temperature of the earth is regulated." On the 21st inst., the Rev. J. R. Jenkins, of Tenby, delivered a lecture on "The Press and the People." The history of the press in all its phases, its political influence, its moral and intellectual benefits, were severally stated, and the importance of a free press, to which it was believed the high position of England at the present time might be ascribed, was strongly insisted on.

MEETINGS FOR THE ENSUING WEEK.

MON. Royal Inst., 2.—General Monthly Meeting.
London Inst., 7.—Mr. W. H. Monk, "On Chamber Music."
British Architects, 8.—Discussion "On the Drainage of Buildings and Streets in the Metropolis."
Chemical, 8.
Entomological, 8.

TUES. Royal Inst., 3.—Prof. J. Tyndall, "On Heat."
Horticultural, 3.
Civil Engineers, 8.—1. Mr. C. W. Williams, "On the Management of Furnaces, with a view to the Prevention of the Waste and Nuisance from Smoke." 2. Mr. J. Simpson, jun., "On the Consumption of Smoke in Engine Furnaces."
Linnæan, 8.
Pathological, 8.

WED. London Inst., 2.—Mr. E. W. Brayley, jun., "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-metallic Elements."
Society of Arts, 8.—Adjourned Discussion on "Agricultural Statistics."
Geological, 8. — 1. M. Adolphe Schlagnitweit, "On the Geological Structure and Erratic Phenomena of part of the Bavarian Alps." 2. Mr. J. Trimnien, "On the Mammaliferous Deposits of the Valley of the Nene, near Peterborough."

THURS. Royal Inst., 3.—Prof. Wharton Jones, "On Animal Physiology."
Zoological, 3.
London Inst., 7.—Mr. Cowden Clarke, "On Novel Writers."
Antiquaries, 8.
Photographic, 8.
Royal, 8½.

FRI. Architectural Inst., 8.—Class of Design.
Astronomical, 8.
Botanical, 8.
Philological, 8.
Royal Inst., 8½.—Rev. J. Barlow, "On Silica and some of its Applications to the Arts."

SAT. London Inst., 2.—Mr. E. W. Brayley, jun., "On Physical Geography."
Royal Inst., 3.—Prof. Miller, "On the Chemistry of the Non-metallic Elements."
Royal Botanic, 3¾.
Medical, 8.
Asiatic, 8½.—Professor Wilson, "On Buddha and Buddhism."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 23rd March, 1854.

Par. Numb.
114. Committee of Selection—Seventh Report.
Oxford and Cambridge Universities—Correspondence, Part 2, University of Cambridge.
Oxford and Cambridge Universities—Correspondence, Part 3, Pembroke College, Oxford.
Statistical Abstract for the United Kingdom, 1840 to 1853.

Delivered on 24th March, 1854.

44. Local Acts—Reports from the Admiralty.
101. Hops—Return.
45. Bills—Judgment, Execution, &c.
48. Bills—Public Libraries and Museums.
50. Bills—Dublin Carriage.
51. Bills—Income Tax.

Delivered on 25th and 27th March, 1854.

44. Local Acts—Reports from the Admiralty.
116. University Matriculations—Return.
118. Hops—Return.
52. Bill—Carlisle Canonries.

SESSION 1852-3.

1017. Cambridge University—Index to Report of Commissioners. (Delivered 24th March.)
1017. (1) Oxford University—Index to Report of Commissioners.
1017. (2) Dublin University—Index to Report of Commissioners.

Delivered on 28th March, 1854.

108. Bankruptcy Court (Ireland)—Returns.
113. Consolidated Annuities (Ireland)—Return.
119. University Degrees—Return.
49. Bills—Dublin Port.

SESSION, 1852-3.

41. (1) Indian Territories—Index to Lords' Reports.

Delivered on 29th March, 1854.

44. Local Acts—Reports from the Admiralty.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, 24*th March*, 1854.]

Dated 17th December, 1853.

2945 J. S. Cookings, Birmingham—Buttons.

Dated 21st December, 1853.

2971. J. Jones, Glasgow—Propelling vessels.

Dated 16th January, 1854.

102. G. F. Wilson, Belmont, Vauxhall—Castor oil.

Dated 18th January, 1854.

123. R. Galloway, Lambeth—Furnaces.

Dated 19th January, 1854.

127. J. Spiller, Battersea—Measuring, grinding, &c., wheat.

Dated 20th February, 1854.

399. R. C. J. Prevet, Paris—Paper from plants.

Dated 24th February, 1854.

449. B. J. Green, Birmingham—Corrugated elastic materials.

Dated 27th February, 1854.

470. E. Chappuis, St Mary Axe—Illuminators.

Dated 28th February, 1854.

483. W. Simpson, Maidstone—Soapy product from straw pulp.

Dated 4th March, 1854.

525. E. Rowland, Manchester—Bricks or tiles.
529. F. Abate, 21, George street, Hampstead road—Ornamenting surfaces.
531. F. H. Wenham, Effra Vale Lodge, Brixton—Water meter.

Dated 6th March, 1854.

535. J. Galloway, Bolton le Moors—Cocks, taps, and valves.
537. S. A. Chapin, Trafalgar square—Purifying smoke and obtaining products therefrom. (A communication.)
539. J. Ronald, Patrick Bank, near Paisley—Printing yarns.
541. J. R. Morton, Oxford street—Lamp shades and reflectors.

Dated 7th March, 1854.

545. F. Rixon, Cockspur street—Lowering ships' boats.

Dated 8th March, 1854.

547. T. Dunn, Pendleton—Moving engines, &c., from one line of rails to another, and turning them.
551. R. Boyell, Nottingham—Safety guard for prevention of fire.
555. W. S. Losh, Wreay Syke—Decoloring resins.
557. J. Aitken, Longsight, near Manchester—Motive power.
559. J. Brown, 71, Leadenhall street—Swinging furniture, &c.

Dated 9th March, 1854.

561. W. W. Good, Moorgate street—Thrashing machines.
563. G. T. Selby, Smethwick—Tubes and pipes.
564. J. H. Johnson, 47, Lincoln's inn fields—Finishing fabrics. (A communication.)
565. W. B. Johnson, Manchester—Strengthening ends of tubes.
566. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Reaping machine. (A communication.)
567. W. Young, Queen street, Cheapside—Lamps.
568. J. H. Swan, Glasgow—Tuyeres.
569. F. E. S. Garnier, Paris—Preparing flax.
570. H. Lamy, Paris—Preserving animal and vegetable substances.

Dated 10th March, 1854.

572. E. A. Desrousseaux, Roubaix—Looms.
573. W. Peace, Haigh, near Wigan—Meter and governor.
574. S. Moseley, Hull—Artificial palates.
575. J. Lawrence, Leeds—Rotatory engine.
576. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Candles. (A communication.)
577. J. Buchanan, Leamington Priors—Communicating motion.
578. W. Day, Beverley—Covered carts.
579. F. and W. Whitehead, Crayford—Raising water, &c.
580. W. Mill, Birmingham—Inkstands.
581. A. V. Newton, 66, Chancery lane—Raised printing surfaces. (A communication.)
582. A. V. Newton, 66, Chancery lane—Purifying gas. (A communication.)
583. D. P. Lefèvre, Paris—Railway brake.
584. Z. Boitteux, Epinal—Machinery for carving.
586. J. Patterson, Beverley—Machines for washing cloth.
587. J. H. Johnson, 47, Lincoln's inn fields—Hollow jewellery. (A communication.

Dated 11th March, 1854.

590. W. T. Monzani, St. James's terrace, Bermondsey—Bedsteads.
592. W. Tytherleigh, Birmingham—Tea kettles.
596. J. Sparrow, jun., Wolverhampton—Shears for cutting metals.

Dated 14th March, 1854.

610. A. W. Conner, 3, Crooked lane, Cannon street—Moulding bricks.
612. J. Hands, Epsom—Kilns.

Dated 15th March, 1854.

614. R. A. Brooman, 166, Fleet street—Sector presses. (A communication.
618. T. S. and C. H. Holt, Manchester—Steam boilers.
620. L. Whittaker and G. Lyons, Haslingden—Carding engines.
622. A. Trueman, Swansea—Furnace for copper ores.
624. A. E. P. Le Gros, Paris—Preserving timber.
626. G. Pead and C. Wyatt, Conduit street, Regent street—Instrument for ascertaining wear of railway bearing springs.

WEEKLY LIST OF PATENTS SEALED.

Sealed March 23rd, 1854.

2198. Charles Alexander, of 373, Albany road, Camberwell—Certain manner of preparing marquetry and all other kinds of inlaid work in veneers of various thicknesses, and for fixing the same to walls and ceilings of whatever kind, and in or upon floors of wood, stone, or metal, and for rendering such floors water and fire proof.
2200. Robert Varvill, of 30, High Ousegate, York—Improved morticing machine.

Sealed March 25th, 1854.

2210. Joseph Ellisdon, of London—Improvements in chairs, whereby they are rendered more portable, and can be converted into other useful articles of household furniture.
2213. Francis Frederick Closeman, of 16 A, Park-lane, Hyde Park.—The production and application of certain materials to be employed in the manufacture of textile fabrics, and for other purposes.
2217. Isaac Bury, of Lower Mosley-street, Manchester, and William Green of Islington—Improvements in treating, stretching, or finishing textile fabrics, and in machinery or apparatus for effecting the same.
2248. Samuel Murland, of Castlewellan—Improvements in machinery for preparing linen yarn.
2280. William Littell Tizard, of Aldgate—Improvements in thermometers, and other like indicators.
2281. John Milner, of Stratford—Improvements in steam engines.
2320. Richard Archibald Brooman, of 166, Fleet-street—Improvements in railways switches.
2418. Alexis Dussuc, of 33, Grove-place, Brompton—Improved machine for digging and cultivating land.
2463. Alfred Vincent Newton, of 66, Chancery-lane—Improved construction of printing press.
2473. Edward Joseph Hughes, of Manchester—Improvements in machinery or apparatus for sewing or stitching.
2494. Richard Archibald Brooman, of 166, Fleet-street—Improvements in the manufacture of coloured and ornamented fabrics
2564. William Edward Newton, of 66 Chancery-lane—Improved machinery for crushing ores, and separating therefrom gold, silver, or other metals contained therein.
2570. John Banks Nicklin, of Bartholomew-lane—Improved gelatinous or glutinous compounds for lubricating railway and other machinery.
2839. Alfred Vincent Newton, of 66 Chancery-lane—Improvements in fire-arms and ordnance.
3009. John Barnes, of Church—Improvement or improvements in dyeing and cleansing cotton, silk, wool, and other fabrics.
3019. James William Crossley, of Brighouse—Improvements in the production of surface finish to certain descriptions of fabrics composed of worsted, cotton, or silk, or combinations thereof.
47. Richard Albert Tilghman, of Philadelphia, U.S.—Improvements in treating fatty and oily matters, chiefly applicable to the manufacture of soap, candles, and glycerine.
58. Alexander Mitchell, of Belfast—Improvement in propelling vessels.
120. William Thomas. of Cheapside—Improvements in stays.
155. Charles John Edwards, of Great Sutton-street—Improvements in the manufacture of bands for driving machinery.
160. Thomas Robinson, of 5, Farringdon-street—Improvements in apparatus for filtering volatile liquids.
182. Samuel Cunliffe Lister, of Manningham—Improvements in combing wool, cotton, and other fibrous materials.
227. John Kershaw, of Dublin—Improvements in steam engines.
265. John Hamilton Glassford, of Glasgow—Improvements in lithographic and zincographic printing.

Sealed March 29th, 1854.

2231. François Julien Raux, of Montmartre—Improvements in railway brakes.
2237. John Henry Johnson, of Lincoln's inn Fields—Improvements in apparatus for throwing out ropes or lines, for the better preservation of life and property. (A communication.)
2277. Samuel Leake Worth, of Oxford street, and Agmond Disdin Vesey Canavan, of Fitzroy street—Invention of an improved polishing and brightening surface.
2309. William Potts, of Birmingham—Improvements in mantel-pieces.
2366. Andrew Mc Lean, and William Fraser Rae, both of Edinburgh—Improvements in apparatus for the manufacture of aerated liquids.
2380. Auguste Edouard Loradoux Bellford, of Castle street, Holborn—Certain improvements in the treatment of copper ores. (A communication.)
2404. Emory Rider, of Coleman street—Improvements in the manufacture or treatment of gutta percha, being improvements upon the invention secured to him by letters patent, dated the 20th day of July, 1851. (Partly a communication.)
2408. John Wright Child, of Halifax, and Robert Wilson, of Low Moor Iron Works, Yorkshire—Improvements in regulating motive power engines.
2457. Jean Baptiste Verdun, of Paris—Improvements in the construction of globes.
2527. Henry Tyler, of Queen street—Invention of an improved chair bedstead.
2771. John Carter Ramsden, of Bradford, Yorkshire—Improvements in apparatus, or the mechanism of looms for weaving a certain class of plaids, checks, and fancy woven fabrics.
8. Henry Lee Corlett, of Dublin—Improvements in caoutchouc springs for locomotive engines and tenders, railway carriages, and waggons.
150. Cyprien Marie Tessié du Motay, of Paris—Improvements in the manufacture of oil from rosin.
193. Thomas Wickstead, of Leicester—Improvements in the manufacture of sewage manure.
215. Donald Bethune, of Toronto, Canada—Improvements in the construction of vessels propelled by steam or other motive power.
245. James Jackson, of Broad street, Golden square, and George Morris Hantler, of Sloane street—Improvements in baths.
302. James Taylor, of Carlisle; Isaac Brown, of the same place; and John Brown, of Oxford street—Improvements in the charring of vegetable and animal substances.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854.				
March 25.	3579	A Levigator	William Wahler. Peter Hooker	22, Middleton street, Clerkenwell. 12, Pump row, Old st. road, St. Luke's
„ 28.	3580	The Sling Action Beer Engine	Thomas Frederick Hale	Narrow Wine street, Bristol.
„ 29.	3581	The Albert Star Fire Lighter	George Marriott	Spa road, Bermondsey.
„ 29.	3582	Adjustable Tilt Rest for Beer Barrels	Deane, Dray, and Deane	London Bridge.

Journal of the Society of Arts.

FRIDAY, APRIL 7, 1854.

EXAMINATIONS OF INSTITUTE CLASSES.

The subject of the Classes for Systematic Instruction in the Institutions in Union with this Society has long been under the consideration of the Council. In the replies given by the Institutions to the first circular, addressed to them by the Council, in March 1852, its attention was especially drawn to this very difficult subject; and it was discussed at the Annual Conferences in 1852 and 1853. Much important information respecting this subject was given to the Society's late Committee on Industrial Instruction, whose report, with an appendix containing a large amount of valuable correspondence, was published last June.* It appears to be an unanimous opinion that every Institute should have its classes for adult instruction; but this desideratum is at present, in most cases, very difficult, and in many cases impossible, to be attained. Sufficient inducements have not, as yet, been generally given to the members of an Institute to pursue systematic studies in its classes; but it has been suggested that this defect might, in a great measure, be supplied, if stated Examinations, by a Board of competent authority, were to present to those members the stimulus of emulation and competition, together with the honourable reward of a diploma or certificate, which might attest the merit of the examined; and that this Society might greatly benefit the Institutes by undertaking the requisite arrangements for the establishment of such examinations.

The Council is not unwilling to undertake this duty, if the Institutes in Union deliberately desire it; but the best possible scheme of examinations cannot succeed if the Institutes are not now, and are not likely soon to be, in a position to present to the Examiners a sufficient number of candidates properly prepared for examination. Assuming, however, that in due time such candidates will be forthcoming, the Council has considered what measures must be taken by the Society to ensure success, if the Institutes should be able and willing to do their part in this business.

In order that diplomas, or certificates, may be accepted as really valuable testimonials of persevering study and superior attainment, the Examiners must be men of distinguished reputation, and their awards must not be lightly given.

The Council has reason to believe that the Society can obtain the services of Examiners whose names will command confidence.

The details of the Examinations cannot be settled until after the conference of the representatives of the Institutions, in June next. The following is a mere outline, intended to show how the plan would work, and to elicit the opinions of the Institutions. It is proposed:—

1. That the Examinations be held at least once a year (say in March), at convenient places in different districts, the Institutions in each district being grouped together for the purpose.
2. That the examinations be conducted simultaneously by papers previously prepared by the Examiners in London.
3. That every candidate for examination shall have been, for a certain period (say six months), a student of a class in an Institute in Union.
4. That a Local Committee, possessing the confidence of the Institutions at each place of examination, receive the papers by post from the Board; see that the papers are fairly worked by the candidates, without copying from each other, and without books or other assistance; certify that all has been properly conducted; and return the worked papers by post to the Board of Examiners in London.
5. That such worked papers as the Examiners may approve of be divided by them into three classes, according to merit, 1st, 2nd, and 3rd; and that corresponding certificates be issued to the successful candidates.
6. That each certificate state the name and age of the candidate; the total number of lessons given to the class; the number of lessons that he (or she) has attended; the subject, or subjects, on which the candidate was examined; and the result of the examination.
7. That no certificate be awarded for any paper which gave evidence of only a smattering of knowledge, however extensive, or which was not well spelt, and fairly and clearly written.
8. That 1st class certificates be very cautiously awarded, so as to indicate a high standard of solid attainment.
9. That a list of suitable subjects for examination be prepared for the approval of the "Conference." That candidates be examined at their option in any of those subjects; but that no candidate, after his first examination, take up more than two of the subjects in the same year; a thorough knowledge of one or two subjects being far more important than a superficial acquaintance with many.

In putting forth this very important matter for consideration, the Council trusts that it will be borne in mind that success can only be obtained through the hearty co-operation of the Institu-

* The Report of the Committee appointed by the Council of the Society of Arts to inquire into the subject of Industrial Instruction, with the evidence on which the Report is founded. Longman and Co., 1853.

tions. Such co-operation may be given by the Institutions in preparing and bringing forward fit candidates for examination, and by the influential friends of education, in stamping the proposed diplomas with a real commercial value, by acknowledging them as testimonials worthy of credit. It is hoped that few will look coldly upon an attempt to supply to the members of the Literary and Scientific Institutions, Mechanics' Institutes, and Athenæums, in Union with the Society of Arts, a portion, however small, of those advantages which are abundantly offered to the higher classes of the community in their competitive examinations, honours, and degrees.

DECLARATION.

We, the undersigned, having considered the circular letter of the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce, dated March 1854, and the plan therein set forth, for examining and granting certificates to the students of the classes for adult instruction in the Literary and Scientific Institutions, Mechanics' Institutes, Athenæums, and other similar bodies in Union with the said Society, do hereby declare that we desire to promote the success of the said plan, and are prepared to regard as testimonials worthy of credit such CERTIFICATES as may be awarded in conformity thereto.

SEVENTEENTH ORDINARY MEETING.

WEDNESDAY, APRIL 5, 1854.

The Seventeenth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 5th instant, Major-General Sir Charles W. Pasley, K.C.B., Vice-President, in the chair.

The following candidates were balloted for and duly elected:—

Baily, Edwin	Fielding, Edward
Cottam, George Hallen	Simpson, Robert
Ebrington, Viscount	

DISCUSSION ON AGRICULTURAL STATISTICS.

The CHAIRMAN suggested that perhaps the most convenient way of continuing the discussion on this subject, which had been raised on the reading of Mr. Leone Levi's paper at the last meeting, would be for any gentleman who had any plan to propose for collecting these statistics to do so at once, and afterwards to proceed to the discussion or criticism of the different plans.

Mr. WINKWORTH thought that before inviting gentlemen to suggest plans for obtaining agricultural statistics, it would be as well to inquire whether the principle itself was admitted. He would remind the Society, that all sound political economists maintained that the action of commerce should not be interfered with by compulsory revelations, except in some extreme cases, or for fiscal purposes. Now he must beg to say, that he for one could not see why the producers of wheat, for instance, should be placed in a different category from the manufacturers of wool, cotton, silk, or iron. The very fact of the assumed, but not real, ignorance of details, of quantities produced or in progress, was an element of great importance, as the spirit of enterprise or speculation being thereby stimulated, a greater quantity of grain was occasionally grown or imported, than the real exigencies of the country might require. The present, or recent, condition of the corn market would illustrate the advantage of comparative ignorance of actual quantities, such as under the present system now obtained. It was assumed early last season that the harvest would be a defective one; and there certainly was some trustworthy evidence to that effect. The result was an enormous importation from America, Russia, and other corn-growing countries, on the one hand, and a larger breadth of land than last year being placed under cultivation for wheat, on the other. The high prices obtained for grain stimulated this action. Whether, however, the present tendency to reduced prices was to be attributed to larger reserves being brought to market than were supposed to be in existence, or to an excess of importation, or to a larger quantity being actually cut last harvest than was expected, or to all these combined, certain it was that no apprehension was now entertained of a continued scarcity, and some speculators would probably "burn their fingers." The country at large, however, gained by this: the price of the staff of life came down to the ability of the consumer, and as the importations must immediately or ultimately be paid for in English manufactures, a greater amount of wealth was produced and distributed than would, otherwise, have come into existence. Again he might observe that, assuming statistics of agriculture to be obtained and made patent to the world, would there not be a danger of an undue, and therefore a mischiveous, reliance being placed in them, and which reliance would be aggravated in its ultimate effects by producers simultaneously observing a like policy? When left however to independent action, the natural stimulus to speculation would sooner or later lead to a healthy condition of the grain markets, and to an average fair price of that important article. He was not prepared at that moment to pursue the subject further, but hoped he had said enough to justify a little hesitation before adopting the ingenious plans of Mr. Levi and of other gentlemen, who had addressed the Society on the former evening.

Mr. LUMLEY wished to make a few observations, though he would not go into the question raised by the last speaker, considering it settled at the former meeting, that it was desirable to have established as perfect a system of collecting agricultural statistics as possible. That for this object a scheme could be adopted, was proved by the recent experiments in Norfolk and Hampshire, the inquiries having only failed to elicit information to the extent of 2½ per cent. on those made in Norfolk, and 3½ per cent. in Hampshire, which he thought must be considered a very satisfactory result. If a general system of agricultural statistics could be carried out, they might expect to derive very important information, which would be of great advantage to the country; and he thought the Government could well avail themselves of the machinery they possessed under the Poor Law Board for that purpose. He then detailed the steps adopted by Sir John Walsham, in Norfolk, and Mr. Hawley, in Hampshire—both gentlemen of intelligence, activity, and influence in their respective counties. The system adopted in these proceedings was this. The guardians of each Union were requested to obtain the requisite information on the subject, which was collected through their various relieving officers. Lists were made out containing the information required, and there were sent by the relieving officers to the various farmers and occupiers in the districts. The documents requested information as to the state of the country with reference to the extent of the crops under cultivation on the 18th of July, and as to the number of cattle and stock on the 18th of October. These lists, when obtained by the relieving officers, were forwarded to the clerks of the respective Unions, by whom they had been classified and abstracted, and the results were supplied to the Inspectors, Sir John Walsham and Mr. Hawley, by whom reports had been

despatched to the Poor Law Board. As the results of these experiments had been so satisfactory, he considered the system might be extended all over the country, and the Government put into the possession of this very valuable information. Some persons had suggested that the required information might be better obtained through the Tithe Commissioners, but he believed that the duties of that commission would soon terminate, and consequently that Board could not be properly entrusted to carry out a permanent measure. He therefore considered, that the Board of Guardians would be the best parties through whom to obtain the information, which it must be remembered was not altogether foreign to them, seeing their interest in the value of all the property in their Unions. At the same time, he admitted that there would be difficulties in carrying out the scheme until it had been tested by experience.

Dr. WADDILOVE was about to point out the nature of the information which he thought would be required, and the difficulties of drawing any sound conclusion from the returns, in consequence of the differences of seasons, when

The CHAIRMAN said, that as Mr. Levi had a plan for collecting the statistics which he wished to submit to the meeting, he thought they had better hear that first, before proceeding with the discussion. Personally, he knew nothing of agriculture, but he had formerly obtained a great deal of information relative to the supplies which could be obtained, when engaged in providing for feeding the troops. He believed, that if every portion of the army was left to provide for itself, as the sappers and miners, and guards did, it would be most profitable, and if they could obtain the prices of grain in every part of the kingdom, on the plan of those published in the *Mark Lane Express*, it could do no harm if it did not do good. Indeed he believed it must prove beneficial, though it might prevent one man making a large fortune by the ruin of many.

Mr. LEVI said, that although, in the order of the proceedings, any further remarks on his part should be deferred to the conclusion of the discussion, he found it essential, after having dealt with the general principle as to the importance and expediency of obtaining agricultural statistics, to prepare a plan of the machinery which might be adopted for the purpose. He trusted he had established the leading proposition, that such statistics were wanted; what remained now to ascertain was, by what means they might be collected. In order to provide for this great desideratum, there was required,—first, a competent Central Board; secondly, a good local machinery; and thirdly, a number of able inspectors. As the objects of inquiry, there were two distinct branches — first, the acreage of the several crops; second, their probable yield. With respect to the Central Board, whilst leaving it to government to choose which existing office possessed the best machinery for the purpose, he might be allowed to suggest that an amalgamation of the Tithe Commission and Poor Law Board might, perhaps, be the best. It was all-important that the Central Board should have a complete system of maps, and accurate information respecting the various lands throughout the country. This the Tithe Commission eminently possessed. At the same time the Poor Law Board might, perhaps, command the best local machinery for the purpose. As to the means by which the acreage under the different crops might be collected, he would suggest that those adopted for the counties of Norfolk and Hampshire, if found to be successful, be pursued for the whole country. But he would not fetter the action of the several boards, as what might be the best in one county might not be found to be so in another. This inquiry of the acreage might be gone through at an early period of the year, and might be easily obtained. Let them not, however, stop here. It might theoretically be very useful to know how many acres of land were sown in such a year, but what was most required was the probable yield, so that proper measures might be taken in time, in cases of scarcity, to provide sufficient supplies from foreign countries. The available produce was the great item of speculation. He understood that a government inquiry was now in progress to obtain the acreage of land under crop, and not further. He would much regret that, after the representation made by the deputation from the City to Lord Aberdeen, the government should limit this inquiry to the acreage only, which would altogether impair the utility of the measure, and would only cause a comparatively unfruitful expenditure. The plan which he suggested provided also that monthly meteorological observations should be made during the months between July and October, which would prepare for the estimates of the yield. With respect to the mode of obtaining such an estimate, he would recommend the appointment of a number of competent persons in certain districts in each county; and it would be possible to get the returns in time before October, unless, indeed, for exceptional cases, which might be met by supplementary returns. As to the mode suggested by Mr. Caird of getting from the farmers the average produce of former years, it would be all but impossible to obtain such accounts. First, owing to the number of farmers who kept no accounts of the produce; secondly, owing to the quantity of grain left unthreshed; and thirdly, to the extreme differences in the acreage sown, as shown by Mr. Caird himself in his note respecting Ireland. Such was the groundwork of the plan which he would propose to the meeting. It had been said that such an inquiry was in itself an interference, and opposed to the principle of *laissez-faire*. He understood that statistics and political economy were sister sciences (e), and that whatever individual efforts could not accomplish, it remained with the Government to undertake. At the Statistical Congress at Brussels, which was attended by M. Horace Say and many leading economists from Continental Universities, the statistics of agriculture were considered of the first importance. What was now proposed was to obtain for this country what had been obtained with much advantage in other countries. As to what fell from Dr. Waddilove on the former evening, he had clearly misunderstood the question. By the collection of agricultural statistics it was never meant that the produce of the land would be increased unless, indeed, incidentally, as the facts thereby shown might spur on to greater energies

(e) The following admirable statement on the connection of statistics and political economy, formed part of the inaugural address by M. Quetelet, President of the Statistical Congress at Brussels, in October, 1852:—

"En jetant les yeux sur cette réunion imposante, un fait, bien significatif, se révèle d'abord, et nous sommes heureux de pouvoir le constater, c'est la présence ici d'un grand nombre d'économistes du talent le plus distingué, présence qui proteste contre le prétendu divorce que quelques esprits chagrins ou superficiels voudraient voir prononcer entre la statistique et l'économie politique, entre l'observation et la science qui se doivent un appui mutuel, et qui s'éclairent l'une l'autre. Sans doute, il est des écarts dont la statistique s'est rendue coupable, des abus auxquels elle s'est prêtée en voulant étayer de faux systèmes ou faire prévaloir des idées préconçues, sans doute elle est sortie parfois des limites dans lesquelles elle doit se renfermer; mais les bons esprits n'ont jamais songé à proscrire une science, surtout une science naissante, pour s'être écartée parfois de sa véritable direction. Combien de temps l'astrologie n'a-t-elle pas usurpé la place de la véritable science des astres; l'alchimie le rang de la science des Lavoisier et des Berzélius! Chaque science a débuté par des méprises, souvent même par de déplorables abus. Ce qui peut nous étonner, ce n'est pas que la statistique ait érré; mais que, si près de sa naissance, elle ait déjà compris sa mission, et senti le besoin de régulariser sa marche."

on the part of the farmers; secondly, that we could not control the elements, as if statistics intended to perform miracles. All that we asked was—Let us have facts as accurate as possible, and truth and information would produce their wonted effect. He would now call their attention to the machinery suggested, trusting it would receive a careful consideration. In the preparation of this plan he acknowledged the valuable assistance he had received from most eminent men, and he had also much profited by the previous discussion on the subject. Mr. Levi then proceeded to say that he considered it had been established that the collection of agricultural statistics was expedient and practical. He, therefore, begged to suggest that the following machinery should be employed for the purpose:—*Plan of Operations.*—1. That a Central Commission (a) be authorised to obtain from the several Boards of Guardians in England and Wales annual returns of the total acreage (distinguishing estimated from ascertained acreage) comprised in each union, showing therein the total acreage of each parish or extra parochial place within the union separately, together with the acrerage of the several crops, or state of the whole of the land in such parish. 2. The Boards of Guardians to be authorized to prepare the requisite returns by such ways and means as they may deem most expedient, (b) having due regard to the utmost practicable accuracy as well as economy. 3. These returns to be forwarded to the Central Board on or before the first of June in each year, for the purpose of arrangement and publication. 4. Meteorological observations to be made throughout the country, and monthly accounts of the same to be forwarded to the Central Board, indicating the influence of the weather on the growing crops at the most critical period, during the three months previous to harvest operations. 5. That the Central Board be authorised to appoint one fit and competent inspector in every county in England and Wales, (c) in order to test the practicability of the scheme in the first instance; to undertake the superintendence of certain defined districts, and report to the Central Board on or before the first of October, what, in his judgment, will be the average yield of the several crops in the district so superintended. 6. Such district to represent, as far as possible, the average of the county in which it is situated.(d) 7. Each inspector's return to be signed by him, and to be published. The several inspectors to be instructed to furnish the Central Board with such general remarks, as to those crops on the lands in his county not included in the district specially assigned to him, as he may deem important. 8. These returns, when reviewed, to be published by the Central Board without delay. 9. The expenses incident to the proposed annual returns and inspection, assumed to be about £40,000, should be defrayed by Government, the measure being of national importance. 10. The Highland and Agricultural Society of Scotland to be intrusted with the collection of the agricultural statistics of that part of the kingdom, to be published in the same form, and as nearly as possible at the same time, as those for England and Wales. 11. The agricultural statistics of Ireland to be collected on the same plan, by means of the stipendiary force which have hitherto ably performed this onerous duty.

Mr. MORTON said, that those gentlemen who were present at the meeting last Wednesday, might remember that he then stated the particulars of the sale of a crop amounting to about 600 quarters of wheat, which was in hand in October, 1846. He spoke then without memoranda of exact dates and quantities, and he had since ascertained that he was in error on one or two points, but as they did not at all affect the argument which was built upon them, he should not refer to them now. The fact was, that 500 quarters of that corn were sold in the autumn and winter of 1846, while wheat averaged less than 60s. a quarter. Corn rose in May and June to upwards of 5*l.* a quarter; and in September, when it had again fallen to 7s. 6d. a bushel, the remaining 100 quarters of this crop were disposed of. Of course, he knew nothing certain, as to whether, or how much, the harvest of 1846 was below an average one. If he had, the wheat would not have been allowed to go to market except at a price as much (or more) in proportion above an average price, as the corn in the country was believed to be below an average supply; and the argument, so far as such a thing could be built upon a single instance, went fairly, he thought, to show how ignorance of that guide as to the probable run of prices, which correct agricultural statistics would furnish, was a great injury to the farmer. He understood it was desired that the discussion this evening should be chiefly directed to criticism of the various methods which had been proposed for collecting annual statistics of agricultural produce, and most people would agree with those who had so arranged it that the preliminary question as to the utility of the information thus to be acquired, had already been completely and conclusively answered in the affirmative. He must assure the meeting, however, that the tenant farmers of the country were not nearly unanimous on this head. Many intelligent agriculturists, whatever might be their opinion as to the bearing of this movement on the interests of the nation generally, believed that by guiding the movements of importers, it would tend to cheapen corn, and so injure the growers of corn. And as it was of importance for the success and accuracy of the inquiry that it should be conducted not in spite of, but by means of, the agricultural interest, he should be glad to be permitted to call attention to some further evidence bearing upon this point which he had collected since last Wednesday. He was very glad to hear Mr. Caird bear testimony at the last meeting to the frankness and liberality with which farmers received and met inquiries into the details of their business; no one could bear so valuable a testimony on that particular point as Mr. Caird; but so far as a much less extensive experience than that gentleman's had gone, he might add, that he could entirely corroborate what had been said. For the last six or eight years he had obtained information at harvest-time by inquiries addressed to between 300 and 400 gentlemen, occupying land in every county of England and Ireland, and most of those in Scotland, information *readily supplied*—and as trustworthy as intelligence and careful observation could cause mere opinion to be. This information had been published in the *Agricultural Gazette* shortly before harvest in every year, and he could refer to testimony borne in every quarter to the value (in particular instances) of this *im*perfect statistical information, as a guide to behaviour in the corn market. But perhaps no better illustration could be offered of the readiness with which agricultural information was given to inquirers than the following:—On Monday last he was bold enough to write twenty letters, containing the following question—"What was the date and the amount of each successive sale by which you disposed of the wheat, whether new or old, which you had in hand, whether in granary, rick, or field, in October, 1846?" These letters he addressed to gentlemen farming in the north of Scotland, in Fifeshire, in the Lothians, in the south of Scotland, Northumberland,

(a) It is suggested that the Central Commission be formed of officials from the Tithe and Inclosure Commission and the Poor Law Board. The former possess a complete system of maps of the various districts of the country; the latter is in direct communication with the Boards of Guardians. The amalgamation of these two Boards for the purpose would provide what is required from both.

(b) The Boards of Guardians should have at their discretion the appointment of Committees composed of some from among themselves, and some select farmers to inspect the returns of the acreage under the different crops.

(c) There are 52 or 54 counties in England and Wales, divided into 16,008 parishes, and comprising 37,324,915 acres.

(d) These to represent all the diversities of soil, culture, and climate, so that the returns being multiplied by the number of districts, shall exhibit the agricultural statistics of the country sufficiently accurate for all practical purposes.

Yorkshire, Lincolnshire, Worcestershire, Gloucestershire, Devonshire, Berkshire, Sussex, Kent, and Hampshire—to gentlemen with but few of whom he could claim more than nominal acquaintance. Of course he stated the reasons for putting such an extraordinary and almost impudent question; and, by return of post, he received full details of the way in which upwards of 50,000 bushels of wheat, owned in October, 1846, were disposed of; the agricultural statistics—in a much more detailed form than Mr. Cardwell desired them—of at least 1500 acres of wheat, corresponding to probably 10,000 acres of arable land in those several counties. And it was to the way in which these sales illustrated the farmer's interest in the early publication of trustworthy agricultural information that he would now call attention. He had not been able to make use of all the information that he had received. In some cases it was given too generally to be useful; in others the inquiry was misunderstood; in a few it came too late; but even where the object of the inquiry was disapproved of—and in some instances it was strongly disapproved of—the information was frankly given him. He then explained a diagram referring to the sales of nearly 40,000 bushels of wheat owned by farmers. The red curved or rugged line indicated the way in which prices rose and fell during the months from August, 1846, to December, 1847. This line was obtained by adopting a certain scale, to represent a given amount of money, and drawing verticals from a base line at the different months; the verticals being marked off in each case at a point corresponding to the price at the given time, and through these points the curved or rugged line was drawn. The upright black lines, drawn to a scale, indicated sales of wheat—their position on the diagram indicated the date of each—their length, or rather height upon the base line indicated the amount of each. It would be seen, that the tallest of the black lines indicated single sales of upwards of 200 quarters each. It needed no statement of facts, such as this diagram represented, to teach any one that, demand being constant, price must just be inversely as the supply—that every case of a sudden rise or sudden fall in price, was just an instance of unexpected abundance or unexpected deficiency in supply; having its origin, therefore, in the ignorance which statistics would remove—that just in proportion as prices were excessive, was the fewness of the farmers who benefited by them, and the injury to the many who had thus sold at a price below the natural range of the year. But it was believed, nevertheless, that an actual record of *bona fide* sales might be more influential than mere reasoning; and as such he commended this diagram to the attention of those agriculturists who believed that statistical information would be useless to them. They would see what a large number of sales crossed the red line where it was very low down—that lowness being, in fact, the consequence of that number of sales—and what a small number of sales took place during high prices. October saw upwards of 800 quarters sold; May saw about 80. Let them remember, too, that the men who had given him the information from which this diagram was drawn, were all first-class men, intelligent men, and acknowledged as such in their several localities;—strong men, too (he meant as capitalists), and under no necessity to make hurried sales of their crops. In one instance, an extensive farmer, who grew 1,100 quarters of wheat in 1846, and was under no necessity to dispose of his wheat in August and September, acted simply as a reasonable man, as every one knew him to be. Wheat had been falling ever since May, and so immediately after his early harvest, he threshed out nearly one quarter of his whole produce, and sold 240 quarters in August, so as to get the highest price of the season. The fact was, he got the *lowest*—wheat rose thereafter continuously up till June in the following year. This gentleman sold his 1,100 quarters of wheat at prices probably forty shillings a quarter below the maximum of the season. He need not say, *he*, at all events, believed that farmers would be benefited by trustworthy information as to the annual produce of the country. But it was objected by some, that it was only those large growers that would be benefited—small farmers were forced to sell at particular times, and would not be benefited. Now, he would ask, what was the effect on the market, of sales such as two of those marked on the diagram? Would the small farmer not have reaped any of the benefit of this information on the state of the supplies, if it had hindered these large growers from swamping the market just before rent-day, and reducing the prices to all who then were forced into it. It was said, too, that the information would be too late to be useful, and that 1846, in particular, was an extraordinary year, on which no argument could be built. Now there could be no doubt that the returns must be made early, or their usefulness would be very materially impaired; but if they should be published in the beginning of October, as he supposed possible, all the principal growers would wait for them. And as to the year of the potato rot being an unfair year for judging by, he could only say, that the great majority of English growers knew very well what was the value of the potato crop early in September of that year; and that although the Irish loss was not known so early, yet that, the argument being intended to illustrate the real effect of this ignorance upon the interests of the farmer, it might be built with equal force, and of course with greater obviousness upon an extravagant, as upon a more ordinary instance of it. From one of the letters which he had received on this subject, but which did not give information in detail, he would make the following extract: "I sold out all my old wheat in October, 1846, and then I commenced and continued the sale of my new crop until it was disposed of before the succeeding high prices. In this I was advised by one in the corn trade, whose judgment turned out to be wrong, and who subsequently became ruined by his extravagantly altered views when the high prices set in." Now he thought the whole case whether as regarded agriculture or commerce, might well be rested on that one testimony, for it was plainly a two-edged sword against all objections to the collection of agricultural statistics on the score of inutility. Those among farmers who thought that the whole movement was one in which corn merchants alone were interested forgot that they were themselves corn merchants, and that it was of great importance to them, (the smaller capitalists in this trade), that the great importers be guided aright—just as it was to small farmers, bound to sell, that large holders should not ignorantly force produce into the market, and so unnaturally lower prices to their detriment. The blue line of the diagram represented the range of prices since August last year. Every one knew the way in which it had been oscillating during the past three weeks, and what a leap upwards it had latterly taken. The whole affair showed what guesswork the trade really was; and of what importance to all classes, and, as he believed, to farmers especially, the information desired would be.

Mr. Mc'Lachlan observed from the table of Mr. Levi, that about 10,000,000 quarters of grain were annually imported into England from foreign parts; Canada, America, and the ports in the Mediterranean and Baltic seas being the principal places from which the supplies were drawn. Now to pay for these 10,000,000 quarters of grain about £40,000,000 were required; and if, when the consignments arrived in England, the merchants had not the money to pay for them, they had to enter into arrangements with the consignees which enhanced the price to the consumers. It appeared that the money in the Bank of England was not equal to two per cent. on the capital of the country. The property of England was estimated at £500,000,000, whilst there was not £10,000,000 in the bank—indeed he doubted if there was £7,000,000 of actual capital. he Chancellor of the Exchequer might issue Exchequer bills for £5,000,000 or £6,000,000, but that could not be called capital. In 1846-7 the price of wheat rose 90 per cent.,

there being nothing to justify the rise excepting the high price and scarcity of money. He believed that if they obtained the statistics required, they would do but little to regulate the prices of grain, the fluctuations in which took place from time to time without any justifiable cause excepting the value of money. What they wanted was more capital and less accommodation in the corn trade, so as to prevent a few having the power of raising the value of grain according to the pressure upon the market. He alluded to this because he felt it his duty to do everything to promote the cause of humanity, he having seen in India hundreds of persons lying by the roadside dying from hunger, whilst those who undertook to supply them with corn were feeding them with lime, gypsum, or any rubbish, to add to their own gains.

Mr. CAMPBELL said the subject under consideration was one of great importance, relating as it did to the first necessary of life; and he considered that to obtain the most correct and regular information with regard to it was of great national importance. The statistics at present before them showed that they were very deficient in information, with regard to the supplies which they could obtain. Several gentlemen had stated that they were compelled to have recourse to foreign countries, and the last speaker had shown that the price was regulated by the means they had to pay for it. To his mind one of the first questions they had to consider was the amount of available land they had in this country for the cultivation of grain. He found that in round numbers the quantity of grain produced in England was only about 20,000,000 quarters per annum, whereas he was told that in Great Britain and Ireland there were at least 70,000,000 acres of land capable of growing food for man, sufficient to supply a population of 100,000,000. He maintained that, having the means, they ought to produce all the grain they required in their own country by the industry of their own people; and thereby be altogether independent of foreign countries, as it was in times of scarcity, or expected scarcity, that they had to compete with France and other countries for the purchase of grain, the price of which was enhanced by the competition, and the ignorance which existed relating to the quantity to be obtained. He was aware that the price did not always depend on the quantity of grain in the market, but on the power of the merchants to hold out for high prices. He knew an instance of large quantities of grain being imported from Ireland and hoarded up in granaries because the market had a downward tendency—the holders consulting others in the trade who advised and assisted in its being held out of the market to keep up prices. The result was that at the end of two years, when nearly spoiled, it was re-shipped to the very part of Ireland from which it had been brought, and, circumstances having altered, realised a profit of 10s. per quarter—that was the commercial way of regulating the price of the food of the people. The commercial way was to keep the land out of cultivation, and the people out of employ, in order that the farmers and the corn merchants might make large profits, and consequently prices fell and rose according to the value of money, in which all commerical transactions were obliged to be settled.

Dr. WADDILOVE must say that in his opinion the plan of Mr. Levi could lead to no practical or beneficial results. What would be the use of endeavouring to take the acreage under cultivation at seed-time; of the condition of the crops in July; and the extent of the crop on the 10th of October? Why, in many of the northern counties the harvest was far from concluded at that time, and even in Berkshire he had seen oats standing out on the 9th of November; and any farmer would tell them that last year a large portion of the crops did not ripen at all. Would that be a test of what they were to expect on the following year? What would be the good of a plan by which they could not ascertain the extent of a crop until it came to hand. How could they provide against scarcity by such a system. The plan proposed by Mr. Caird was better, viz:—To take the wants of the previous year as a guide for the next. He maintained that there were a variety of reasons which rendered it utterly impossible to strike an average of what might be their requirements. If they took the year 1847, they would find 11,000,000 quarters imported, whilst, the following year the quantity fell to 7,000,000, rising again in 1849, to 10,000,000. In the year 1852, the quantity imported was 7,000,000, and in 1853, it rose again to 10,000,000,—the difference arising from a variety of causes, over which they had no control. He believed, that at the present moment there were hundreds of quarters of corn in the country unthreshed. Even if they had accurate returns of the corn in the country, they would not regulate the price of flour, the fluctuations of which were influenced by a great variety of causes. Mr. M'Culloch (a great authority on the subject) said "attempts have been made to estimate the quantity of corn raised in a country from calculations founded on the number of acres in tillage, and on the average produce per acre; but it is plain no accurate account can ever be framed of the extent of land under cultivation. It is perpetually changing from year to year, and the amount of produce varies, not only with the difference of seasons, but also with every improvement of agriculture. From the extensive difficulties of forming anything like correct conclusions as to the state of the crops at any given period, in any extensive country, and still more of estimating the supply and the probable price of corn at any future period, the risk attending the corn trade is proverbially great." He strongly impressed upon gentlemen the necessity of pausing before they pushed this subject forward, and not allow their zeal for information to carry them beyond the path of discretion.

The CHAIRMAN understood the principle as laid down by Mr. Levi was, that the results of one year should serve as a guide for the next. He believed that in October they might get an approximate return of the yield of the harvest, though he was aware that in Scotland it was often later; and he recollected the suspension-bridge at Montrose being carried away, and a large quantity of corn destroyed in the month of November. However, if the principle was good, there could be no difficulty in fixing the time for making the returns of the yield a little later than at present proposed.

Dr. FARR considered it equally desirable to obtain correct statistical information on this subject as any other, though there appeared to be some difficulty in the means of doing so. He did not, however, doubt that this important information could be in a great measure obtained, as, during the last census, when the whole people were enumerated, a great deal of information was obtained from the farmers, which might be useful to the Society in coming to a decision on this subject. They were asked to give the average they had under cultivation, and the number of men employed. Out of 289,000 farmers applied to, there were only 2500 who did not return the acreage. As regarded the number of men employed, the returns were not quite so complete, only 128,000 making the required return; but a large portion of the others, probably, were small farmers, employing no labour beyond that of themselves and families. Mr. Caird had at their last meeting shown them the value of such inquiries, by giving them the breadth of land under cultivation at different periods: it being in Ireland, in 1849, 687,000 acres, and only 353,000 in 1852—or a difference of 100 per cent. He believed that farmers generally would make no objection to returning the amount of yield on their farms; and if they only got the actual yield from a small number of persons, there would be no difficulty in arriving at what was the probable produce of the rest of the country. With regard to the machinery to be employed in obtaining the returns, he thought that could be best settled by the Government.

Mr. NEWMARCH had listened with considerable attention to the discussion and the details of Mr. Levi's plan. In the early part of the discussion he had been much struck

by the observations of Mr. Winkworth; and though that gentleman did not support the popular side of the question, he must be allowed to say they were distinguished by sound sense and sterling philosophy. He did not say that these returns could not be obtained if the Government went earnestly to work for the purpose; but he doubted the utility of the statistics when they were obtained, or that they would be worth the expense incurred in obtaining them. The idea of collecting the information in October, over a large surface of the kingdom, and rendering it useful, appeared to him all but impossible. They would have to employ a large number of persons and great machinery, so that it could hardly be collected in London before the end of the year. It would then have to be drawn up in schedules, and the general results carried out. They were aware that the Irish statistics collected by Major Larcom were not published until fifteen or eighteen months after the period to which they referred, and he thought they must be prepared for as great a delay before the agricultural statistics of England could reach the corn market. At the present moment the parties connected with the corn trade had their own means of obtaining information, which appeared to be very efficient, and he did not think any corn dealer would benefit by the proposed statistics. It was a principle of political economy to allow trade to be carried on without let or hindrance, and he believed there was no principle upon which they were more generally agreed. Something had been said about the manner in which the corn trade was carried on, and some parties seemed to think it a moral offence if the holders of corn did not sell it when prices were depressed, but preferred holding it until they could obtain a profit, though they might rest assured that those who held the longest did did not always get the best profit.

Mr. CAIRD was very sorry the gentleman who had just spoken had not been present at the last meeting, as he would have heard all his arguments successfully combatted. Dr. Waddilove did not appear to understand the manner in which the information was to be collected, or the object of the proposed statistics. He (Mr. Caird) thought that on the average of years, there could not be any difficulty in arriving at the returns they required in October; and he believed they would prove very valuable to the country. He had been astonished to hear a gentleman sitting at the table, and therefore, he presumed, a member of the council of that society whose proceedings were a constant investigation of new facts, (Mr. Winkworth), arguing in favour of ignorance, as he did when he opposed the endeavour to obtain these statistics. The very reason alleged by one gentleman against the inquiry, that the improvements in agriculture from year to year would render the statistics of little use, was, to him, a clear argument in their favour, as they would show what were the results produced by those improvements. One gentleman had said that the value of corn depended on the price of money; if he had said that value of money was measured by the abundance or scarcity of corn, he would have been more correct. Within the last fortnight flour had fallen from 40s. to 33s. a barrel in one week, just at the time when the Black Sea and the Baltic were closed to them by war, which any one would have supposed would have tended to cause prices to rise; and, without a single additional fact to enable them to know their real position with regard to the supplies of grain, it, on the following week, jumped up again from 33s. to 40s. Such fluctuations were the result of want of accurate knowledge of the annual supply of food. He would merely say, with regard to the mode proposed by Mr. Levi for obtaining the returns, that he thought the details had better be left to the government. Notwithstanding the information given them through the Poor Law authorities of the state of agriculture in Hampshire and Norfolk, they had no means of testing its accuracy, and no persons would be satisfied with respect to such returns unless some means were devised by which their accuracy could be tested. The main feature of Mr. Levi's plan was founded on his own proposition and the plan adopted by the Highland Society; and here he might remark, in answer to an objection which had been made, that that Society did get sufficient information for their purpose, and publish it as early as October.

Mr. WINKWORTH, in answer to the singular charge just made against him, begged to say, that he was in no shape the apostle of ignorance. He did not object to the object which the machinery proposed by Mr. Levi was intended to effect, but he did object to any *compulsory* mode of obtaining agricultural statistics from the owners or tenants of land. If not made imperative, there was an end of his argument, but still he doubted whether any reliable statistics of grain could be obtained, and if obtained, whether they would accomplish the object proposed. He was happy to find, though he had previously no doubt, from conversation during the last few minutes, with, probably, the highest living authority on political economy, Mr. Thomas Tooke, that he fully agreed with him in the doctrine he had that evening advocated. Mr. Tooke was not only well known by his standard works on "Prices," but as the gentleman who drew up the celebrated petition presented to the House of Lords in 1820, by the present Marquis of Lansdowne, from certain merchants and bankers of London, praying for the abolition of all duties on importations from foreign countries, a movement which had originated those important relaxations introduced by Mr. Huskisson, and consumated by Sir Robert Peel, from which the nation at large had derived so many and great benefits. He (Mr. Winkworth) esteemed it a high honour to have been one of the few who signed that petition.

Mr. THOMAS TOOKE agreed in the main with the principles stated by Mr. Winkworth at the outset of the discussion, whilst he did not much differ from Mr. Caird. Being a member of the Statistical Society, he believed all statistics were useful, although he thought also that some gentlemen entertained exaggerated views as to the advantage to be derived from them. The fluctuations of the prices in 1846 and 1847 arose from the failure of the potato crop, and the fears which were entertained of famine in France and Belgium, leading to large orders from abroad, and thereby deranging the market. Those fears were no doubt in a great measure exaggerated by the want of accurate information with regard to the grain crops; but the mere publication of these statistics would not altogether remedy the evil. He was surprised to find that it had been stated, that a rise of 1s. a quarter in wheat caused a loss of two millions of money. He could not see that it was a national loss—as if it went out of the pockets of one party, it went into those of others.

A vote of thanks was then passed to Mr. Levi for the paper read on the previous evening, and for bringing the subject before the Society.

Mr. LEVI, in returning thanks, said, with reference to the question put by Mr. Campbell, as to the quantity of land capable of improvement in this country, Mr. Porter, in his "Progress of the Nation," gave a table made by Mr. Couling, as follows:—

Cultivated.	Uncultivated.	Unprofitable.	Summary.
46,522,970	15,000,000	15,871,463	77,394,433

Of the cultivated land,—

The arable and garden land was	19,135,990	acres
Meadow and pasture . . .	27,386,980	„
Waste, capable of improvement	15,000,000	„
Incapable of improvement .	15,871,463	„

And Mr. Porter stated that, supposing the same proportion to be preserved, if the whole of the improvable land now uncultivated were brought to its full use, an addition would be made to the arable and garden land of 6,000,000 acres, which, at the present amount of productiveness, would furnish food for about 9,000,000 people.

The SECRETARY announced that on Wednesday next, the 12th instant, a Paper would be read by Dr. Forbes Royle, F.R.S., "On Indian Fibres."

INSTITUTE BOOK ORDERS.

March Account.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Aylesbury, Mechanics' Institution	17	11	0	11	17	8
Brighton, Mechanics' Institution	13	15	0	10	15	0
Bromley, Literary Institute ...	7	13	0	5	13	2
Bury, Athenæum	19	14	3	15	13	3
East Dereham, Institute ...	2	16	0	2	2	0
East Retford, Literary and Scientific Institution	7	19	2	6	2	2
Gateshead, Mechanics' Institute	3	8	4	2	13	11
Hereford, Permanent Library ...	7	8	0	5	16	6
Leamington, Literary and Scientific Institution	1	7	11½	1	0	7
London, Bank of England, Library, and Literary Association	12	13	0	9	15	7
Maidenhead, Mechanics' Literary and Scientific Institution ...	1	19	6	1	10	11
Pershore, Mechanics' Institution	1	8	6	0	15	9
Poole, Mechanics' Institute ...	26	18	8	20	19	8
Saffron Walden, Literary and Scientific Institution	13	5	3	10	5	2
St. Ives, Institution ...	2	12	0	1	17	11
Sevenoaks, Literary Institution	0	18	9	0	15	5
Wandsworth, Literary and Scientific Institution	7	4	7	5	8	8
West Hartlepool, Literary and Mechanics' Institute	5	7	6	4	0	3
Yarmouth and Southtown, Institute	6	18	6	5	4	0
York, Institute of Popular Science and Literature	4	15	6	3	8	4
	£165	14	5½	125	15	11

Showing a total saving of £39 18s. 6½d., or an average discount of about 25 per cent.

The total number of different Institutions that have availed themselves of this plan during the five months it has been in operation is seventy-six. Of these, two Institutions have given orders every month, or five times; one, four times, one, thrice; eighteen, twice; and fifty-four, once.

It is particularly requested that the Secretaries of Institutes will attend to the instructions contained in the Book Circular, dated 13th October, 1853; that they will send the orders in duplicate on the prescribed forms, and despatch them so as to be at the Society's house not later than the 15th of each month.

AMERICAN PATENT OFFICE.

During the last thirteen years, commencing January 1, 1841, and ending January 1, 1854, there have been 20,867 applicants for patents, 7,120 caveats, 9,353 patents issued, and 883,584 dollars received for duties, fees, &c. The arrears of unexamined new cases on the 1st of January, 1854, amounted to 800; cases rejected, but not withdrawn, 2,300; estimated number of new applications in 1854, 4,000; estimated number of cases to be examined in 1854, (new,) 4,800; estimated number of cases to be re-examined in 1854, (old,) 1,200. In 1848, the force employed in the examining corps were 4 principal and 4 assistant examiners; whole number of new applications, 1,628. In 1851, 6 principal and 6 assistant examiners; whole number of new applications, 2,258. In 1854, 6 principal, 6 assistant, and 6 sub-assistant; whole number of new applications, (probably,) 4,000; on hand, unexamined, January 1st, 1854, 800; new cases to be examined in 1854, 4,800. Besides this, there will be the re-examination of returned cases, applications for re-issue, and applications for extension.

Home Correspondence.

THE PRESERVATION OF GRAIN, AND GRAIN PRODUCERS.

Sir,—The paper of Mr. Leone Levi, on agricultural statistics is valuable for many things, and especially as provoking a discussion on an important subject. It is a very desirable thing to ascertain at all times what is the produce of our crops, but there seems to me to be a still more desirable object, the guarding against the probability of famine, by keeping always in stock such an amount of grain as will carry us over a total failure of harvest for a whole year. If we determined to use the means for rendering the preservation of grain certain, there would be no difficulty in this.

Political economy teaches us that the supply of all necessaries, food included, is most safely left to the operations of individual buying and selling; and that rises in prices are the salutary methods whereby people are unconsciously made to economize their consumption, and thus enable a limited supply to hold out, just as Joseph in the olden time in Egypt kept corn in hand till the year of famine had expired. Joseph did keep corn in hand; and probably the Egyptian dry climate had much to do with its duration: possibly some of the mummy wheat of our time may have been of the identical grain hoarded by Joseph.

Our English grain is of three classes; two of which, oats and barley, are kept in the husk. Wheat is shelled out, and consequently is more exposed. The methods used to preserve it do not seem well adapted to our climate, and it is not considered in the light of a permanent substance, if we may judge from the fact, that while money may be borrowed on the mortgage of pipes of brandy in the docks, the like thing does not so easily take place with a stock of wheat in a granary. The one is considered a real property, the other ephemeral. We hear constantly of damaged wheat, but not of damaged brandy; and of all fluctuating prices those of wheat are the most uncertain. To speculate in wheat, is commonly supposed to require more shrewdness, skill, and knowledge, than most other mercantile transactions, and commercial disasters in wheat are more common than in other commodities.

Why should this be? Why should an article in such universal demand be a source of peril to those dealing in it? The chief apparent reason, apart from ignorance as to qualities, is its perishable nature, the uncertainty of its remaining a fixed quantity in the granary that holds it. A thousand quarters may go in, good sound wheat; and after a time, by the operations of rats, mice, weevil, mildew, and men, may come out five hundred, and this amount reduced in value by the double operations of meting and transit thereof.

Most things connected with the storage and transit of wheat appear to be ill arranged. Home-grown wheat is tied up in sheaves and stacked—the stacks being erected on stone stilts to keep out vermin. It is usually thrashed out to send to market. If bought by the miller, it is ground up; if by the speculator it is conveyed to a granary.

A granary is a building of better or worse construction according to locality and circumstances, and is commonly situated on the banks of a navigable stream, or in a seaport town. In most cases it is exposed to a very moist atmosphere. If of large size, the granary usually consists of many stories, with wooden floors, barely sufficient for a man to stand upright, and with numerous small windows for the purpose of ventilation. The wheat is laid on the floors from eighteen inches to two feet in thickness. Previous to storing, it must have undergone the process of weighing or measuring, which has added to its cost. Transit and storing has added to this expence; and when in the granary it is frequently turned over by men with wooden shovels, to prevent mildew or fermentation by damp. This is third source of expense. Loss by vermin,

or by pilfering, is a fourth item. When sold, there is a fifth and sixth item in re-meting and transit.

Wheat is heavy and the granary must be a very strong building. Owing to the necessity of ventilation, the bulk of wheat stored is only equivalent to one-third or one-half the cubic contents of the building; and this again adds considerably to the dead capital employed, and on which interest has to be calculated. Another evil is, that for want of efficient granaries on a small scale in different localities, there is a tendency to be gathered together of large stocks of wheat in particular districts, which is subsequently redistributed, perhaps carried back to the original localities.

It would appear, then, that the want of efficient storage to preserve wheat permanently is one of the causes not merely of the fluctuations in price, but of a generally much higher price than would obtain if we could make as sure of it as a cargo of deals or coals. More persons would then embark in the trade, and there would be less tendency to make hurried sales for fear of loss. It would be a safer business for monied capitalists; the difference between harvest-time and winter prices would lessen; lucky speculations would be less numerous, but heavy losses would also lesson and general profits would increase. It would be a far better trade for those desirous of obtaining a lower but sure profit on their capital, and the advantages to the general community of obtaining the staple article of their food with little fluctuation in price would be very great.

There does not seem to be any difficulty in the matter, if we can divest ourselves of preconceived ideas; of the notion that a granary or grain receptacle must necessarily be a building with a floor or windows more or less multiplied in altitude. We may reason by analogy as to what is the cheapest and most effective means of securing perishable commodities from the action of the atmosphere and vermin. In England we put our flour in sacks. Brother Jonathan puts his in barrels; which does not thoroughly answer; for, through the fissures or pores, the atmosphere turns sour or musty a portion from half an inch to an inch in thickness, and sometimes the whole mass,—as witness wasted cargoes coming even from Australia, to do duty, mixed with cotton, in our calico-manufactories, and subsequently be washed out by our housewives. If Brother Jonathan wishes really to preserve his flour or his "crackers" undamaged he makes them thoroughly dry and cool, and hermetically seals them in tin cans. This also is a common process to prevent goods being damaged at sea. The Chinese, not having much facility for metal manufacture, line wooden chests with thin sheet-lead or tin and pack their teas in them. In England we keep our tea and sugar in cases of tinned sheet-iron. We preserve meat in tinned cases hermetically sealed. We put fruit into sealed bottles. In all these cases, the object is to exclude the air as well as vermin.

There can be no doubt that if we were to put dry wheat in an hermetically-sealed tinned case, it might be kept as long as the famed "mummy-wheat" of Egypt. This will readily be admitted, but the expense would be queried.

Let us examine into this. A canister is a metallic reservoir; so is a gasometer; so is an iron water-tank in a ship, at a railway-station, or elsewhere; and a cubic foot of water-tank on a very large scale will be found to cost very much less than a cubic foot of canister on a small scale. And if a bushel of wheat be more valuable than a bushel of water, it will clearly pay to put wheat in huge canisters of iron.

The wheat-canister, in short, should be a wrought or cast metal tank of greater or less size, according to the wants of the owner, whether for the farmer's crop or the grain-merchant's stock. This tank should be constructed of small parts connected together by screw-bolts; and, consequently, easily transported from place to place. The internal parts should be galvanized to prevent rust, and the external part also if desired. It should be hermetically tight at all the joints; and the only opening should be what is called a man-hole, that is to say a canister-top, where the lid goes on, large enough to admit a man. When filled with grain, the top should be put on, the fitting of the edge forming an air-tight joint. Wheat put dry into such a vessel, and without any vermin, would remain wheat for any number of years. But an additional advantage to such a reservoir would be an air-pump, by the application of which, for the purpose of exhaustion, any casual vermin would be killed. If the grain were moist, the same air-pump might be used to draw or force a current of warm air through it to carry off the moisture. By this process, and subsequently keeping out the air, the grain might be preserved for any length of time. As the reservoir would be perfectly air-tight and water-tight, it might be buried in the ground with perfect safety; and thus cellars might be rendered available for granaries, economizing space of comparatively little value. The grain would be easily poured in from the surface, and to discharge it an Archimedean screw should be used. The size of the reservoir should be proportioned to the locality; and it should hold a specified number of quarters, so as to serve as a measure of quantity and prevent the expence of meterage.

Reservoirs of this kind, of large size, should be placed in the ground, with rails running above them, so that waggons might run over them and discharge their contents inside by a hopper below. Thus, the grain of a corn district might be concentrated by railway at one spot, and discharged and reloaded at any time with the minimum of manual labour, without the expence of meterage, supposing the waggons to be constructed on the same principle of a specific quantity.

The communicating railways would thus transfer grain without trouble from one locality to another; and if run on to the docks and shipping, the same arrangements would serve both for export and import grain.

If constructed above the ground, a stair or ladder must communicate with the upper part, and the lower part must be formed like a hopper for the purpose of discharge. For many farm localities this arrangement might be best; and wheat might be thrashed into grain direct from the field, and stored.

For public granaries the reservoirs might be made in compartments, and provided with locks, keys, and seals. A merchant might deposit his grain therein, lock it up quite secure against fire, vermin, or robbery, and deposit for any length of time, quite sure that when he might come back he would find it in the same condition, and of the same quantity. Or he might transfer it when away from home, the purchaser receiving it as exact measure, without fresh meterage.

Granaries of this description would occupy less than one-third the cubic space of those of the ordinary description, and their cost would be less than one-fifth.

They might be erected in any part of Europe, without regard to locality or climate.

They might be built as Government Magazines, supposing it were desirable so to invest public money; but the greater security to holders would insure a much larger constant surplus than now usually exists under a sense of insecurity, against decay.

With this security for storing safely, a farmer would have less hesitation in sowing great breadths of land. He would not be driven to market under an average value, and might choose his own time for selling. The fear of loss being dispelled, people would buy with less hesitation, and the great food-stores of the community would by a wholesome competition, insure the great mass of the community against a short supply. But as long as uncertainty shall prevail in the storage of grain, so long will it be a perilous trade to those engaged in it, and so long will the

food of the community be subject to a very irregular fluctuation of prices.

There is nothing difficult in this proposition. It is merely applying existing arrangements to unusual cases. There needs but the practical example to be set by influential people, and the great mass will travel in the same track. To the wealthy agriculturist it will be but the amplification of the principle of the tin-lined corn-bin, that keeps out the rats from the oats of the stable. The experiment might be complete in a month; the experience may spread over all time, or till wheat should cease to be a human food, by the substitution of some vegetable substance better fitted forthe nourishment of man,—a problem not yet solved.

Were this mode of producing grain to become general, the facility of ascertaining stocks and crops after reaping, would be very great. The granaries being measures of quantity, no hand measuring would be needed, and the effects of wet harvest weather might be obviated.

But the mere statistics of quantities, even the stocking of reserves are not the be all and end all. We want also the statistics of men, the producers of the grain. We do not want to be served by slaves of the granary, as the nations of antiquity were served with bread, by the slaves of the mill. "Thou shalt not muzzle the ox that treadeth out the corn," and we ought not to muzzle the labourer who produces it. We do not want to regard him as part of the farm chattels, but as a human creature, to be considered in the general question of national happiness. We do not want to be told that he has so many shillings per week, but a more fixed minimum, viz :—So much of corn per week as will be equivalent to his constant maintenance, with his wife and average number of children, *i. e.* so much of wholesome food as will permit the chemical quantities to maintain all bodily waste,—so much clothing or decent raiment, as will preserve warmth while out of doors—in such lodgings as will afford sufficient and wholesome shelter, and such an amount of fuel as will keep the shelter warm and dry, and afford culinary facility, and so much surplus as will pay for industrial and pleasurable education. It is not sufficient that larger stocks of food be gathered for the rest of the nation if the food producer be pinched, and if the nation can only be supplied by partially underfed slaves, it is evident that our system is wrong and wants amending. It is evident that our machinery needs amending in order to diminish manual drudgery and afford better wages, and that if we have got to the maximum of improvement in our agricultural machinery without being able to afford good wages, it is a proof that our people are too thick upon the ground, and that it is time for them to emigrate from English agriculture to some foreign or colonial soil needing less drudgery to produce a crop. A Cambridge farmer complained to his clergyman of the insubordination of his labourers, and asked why he did not put souls into them. "Souls!" exclaimed the preacher, "at 7s. a-week wages! you can't keep up the bodies at that rate. Pay them good wages, and I will undertake for their souls; but not otherwise." The first thing agricultural land ought to pay is, good wages, and after that profit, and after that rent; and if it will not do this, it is only fit for grazing. We ought not to grow food at the cost of deteriorating our race. No statistics that leave out the question of the well-being of the producer can be satisfactory. If we increase our numbers it must be in conjunction with the ample increase of our food, grown ot imported food, and not the food of underfed slaves. When it arrives at that, we must diminish our numbers by emigration.

That something is wrong we must judge, when we find it stated in the *Times* that the inmates of Irish workhouses are imported into Lancashire, at 4s. per head weekly wages, to replace the weavers out on strike.

The truth is, that while it is desirable to obtain the statistics of the general quality of food, in order to prevent unnecessary fluctuations in price, it is also essential to obtain the statistics of the wages of labour, and circulate them amongst the labourers, in order that they, as well as other buyers and sellers, may find out the best markets, and remove from those which are overstocked.

But the whole question of food-producing is still in its infancy. The chemists have given us glimpses of what we require. The vegetarians have stumbled on a truth which they have read wrongly, and the teetotallers, with their well-meaning bigotry, have helped the mystification. To the eye of reason all would be clear enough, if man would take the trouble to examine. But this must be the subject of another discussion.

Meanwhile, it is my conviction that any agricultural statistics that take in only matter, without considering men as their basis, must be fallacious. The food of a country depending on underpaid labourers must be essentially in a state of fluctuation, by the incessant tendency of the labourers to get away to some better condition, as their knowledge grows, as has been the case in Ireland. Land that could raise wheat at a profit with labour at 10s. per week would clearly go out of cultivation with labour at the wholesome rate of 30s. per week, unless chemical and mechanical skill could dispense with two-thirds of the numbers. Our national object should be to raise the rate of wages, and especially the wages of food producers, for with low paid labourers, no country can be in a healthy political condition, and it will invariably be found that those countries are the most prosperous nationally, where individually the labourer is best provided for by an abundance of all the things constituting bodily and mental health. A Government that pays away national funds in statistical inquiries to benefit, in the first place, the dealers in food, cannot in justice neglect the statistics that may help the labourers to better their own condition. It is not within the power of any Government to determine the minimum of wages, but a Government is competent to point out all deteriorating employments, not yielding the return essential to physical and mental health; and a nation so instructed would come at last to the conviction, that the growth of deteriorating employments should be checked by every countervailing influence. This would open up the question as to the bearing and operation of a sound poor law, confining the tax, or causing it to fall heaviest on the pauper producing employments. When the law of settlement shall be put on an equitable footing, the pauper producing districts and employments will be marked out, and public opinion be brought to bear upon them, as upon any other nuisances. Poverty, save in the case of the physically or mentally disabled, is not a necessity of nature, but a circumstance within the control of human resources. The time will come when the nation will fix a minimum quantity of food as a stimulant for its working population, as it now does for its soldiers, sailors, and paupers, and prohibit the artificial growth of deteriorated men just as it prohibits the sale of unwholesome food. Even now the Life Insurance Offices point out unwholesome lives, and their causes, and practically fine the individuals by increased charges. A sound poor law would operate on pauperising employments in the same mode. In all this there is nothing new. If the agriculturist would apply to his farm labourers the rules that he applies to his cattle when he wishes to obtain the best physical result, he would not be long in obtaining it. If the neglect of these rules were followed by the same ruinous results to himself individually, as would be the case if neglecting his cattle, the man would be cared for in the same manner. While the men can be shuffled away on to the general pauper fund, he pushes off his difficulty on to the shoulders of the nation. It is only by making such men individually more valuable, putting a five or ten men power into each by skilled processes, and paying him good wages, that the man can be made out of a helot into a citizen, and only thus that the employer can be made aware of his value. It will be a proud day for England when these principles (well under-

stood by many) shall pervade the great mass of the community. Every new improvement in production might be accompanied by a corresponding rise in the condition of the producers, if it were understood that they were not permitted to be worse off than soldiers or paupers. That many are not so well off, is not an imputation on their employers; it is a necessary condition of the want of education and low wages, and a result simply of the numbers being in excess of the food. Every employer (with but few exceptions) would more willingly pay high than low wages if his profits would permit him; but, if from ignorance of statistics he continues to work at a failing trade, he must necessarily employ labourers at insufficient wages. Statistics should give the rates of wages paid in agriculture, the quantities of food and necessaries that can be procured with them, the habits, manners. customs, and dwellings,—and these should be compared with the wages paid in the mechanical arts of the textile, iron, and other trades, and with the habits, manners, customs, and dwellings of those working at those trades. It is a certain thing that our capital and our power will increase in proportion to the longevity of our population. It is a much more costly thing to teach and train people up to twenty years, to get ten to fifteen years of inefficient work out of them, than it is to train up people to work twenty-five to thirty-five years of efficient work. If it be a fact that only 5 out of 27 men picked by recruiting sergeants from our northern manufacturing population will pass the surgeon's examination, it is not a condition of things with which we should remain contented. By violating the laws of nature, Ireland became a scene of almost universal distress; by cholera and famine nature provided a remedy for the evil. By examining and pointing out the statistics of the causes leading to distress, England may be preserved from such an infliction, and may gradually grow up to present to the people of the world a standard example of the highest phase of humanity in physical and moral elevation. To accomplish this, it is needful that the deteriorating employments be cast out from amongst us by the institution of improved processes; and when this shall be accomplished, disputes between the employers and the employed will be ended. Meanwhile the direct poorhouse for the relief of those suffering by accidental poverty would be a far less evil than the indirect processes tending to increase their numbers and render the condition of misery a normal one, as with the seamstresses now passing away.

I am, Sir, yours faithfully,
W. BRIDGES ADAMS.

April 5, 1854.

MUSEUM OF INDUSTRIAL ART AT LEIGNITZ.

SIR,—I am gratified that you considered my report upon the factory system of Prussia of sufficient interest to be quoted so largely in your journal. In that report I only glanced at a subject which I think it is desirable should be known by all who are promoting art education. I allude to the museum of Herr Von Minutoli, referred to at page 96. This gentleman, who, as Councillor of State (Regierungs Rath) of the regency of Liegnitz, had cognizance of that part of Silesia so celebrated for its linen fabrics, and the seat of other branches of industry, was in a position to be thoroughly acquainted with the precise condition of the province, and actuated by the desire of ministering to the wants of his countrymen, of rescuing them from poverty and unprofitable occupations, and of again raising the fame and character of Silesian manufactures, commenced a collection of works of industrial art. Visiting foreign countries in pursuance of various commissions from his government, he had especial opportunities of selecting examples, and after twelve or fourteen years' pursuit of his object, he brought together the materials for a museum. The government recognized his labours, and promoted his views; they granted a part of the Royal Castle of Liegnitz for their reception and arrangement. It will be seen that the museum is for study and improvement, not merely for general amusement. Not only may the form and colour of an article be admired, but its component materials may be studied, their adaptation for the purpose, and the different modes of handling, and fabricating the same materials, and, in many instances, the tools of the workmen. Men who have studied in the museum have been sent into the various manufactories of the province, in the hope of importing in them fresh intelligence. The museum is in one of the extreme provinces of Prussia, in a town of no great magnitude, the centre, however, of what was once the most industrious part of the kingdom; it is adapted especially, although not exclusively, to the wants of the province; it is accessible for study, and to the public, and was formed at the sole expence and is still the property of Herr Von Minutoli; a memorable instance of the devotion of private energy and of private generosity in the discharge of the public duties of his office.

I quote the following from an address by Dr. Sammter, of Liegnitz, delivered in the lecture-room of the museum, explanatory of its contents, and the objects of the founder.

I am, Sir, your obedient servant,
ALEXANDER REDGRAVE.

London, March 29, 1854.

"The founder of this collection, who, from his official position, had the opportunity of becoming familiar with the nature and wants of the industry of our country, and particularly with the causes which impeded the industry of Silesia, considered that the contemplation and study of examples of high excellence would tend to excite emulation and to improve taste. This feeling engaged him to form a collection of examples, not, however, confined to the specialities of the province, but connected with the trade and commerce of the whole country. In a few years the materials for a museum were collected, for the reception of which there was no local accomodation. The king and the government, appreciating the intentions of Herr Von Minutoli, appropriated a considerable part of the Royal Castle of Liegnitz for the arrangement of the collection. Herr Von Minutoli thus describes the object of the collection:—'The collection is neither a museum of art nor of antiquities. It is rather a collection of works of industry and was originated in the desire of aiding in the improvement of the fabric, by the examination of examples of at tested excellence, adapted, not only to those branches of industry already developed in Silesia, but to others, which from local advantages might be introduced. The subjects therefore, bear upon the artistic products of industry, partly works of classical antiquity, partly of the quatro-cinque, and sci-cento period, when the regeneration of art flourished, and art, in connection with industry, created works which will remain examples for all time. Upon these products, the value of which is analogous to the genius creating them, the principal attention was directed. When these are contrasted with more modern examples, the decline of technical knowledge and art is apparent.

"'As the efforts of art and workmanship approach and combine in production, it follows that art must predominate. This must be allowed, as in the works of masters, who were at the same time artists and workmen, and whose products are of corresponding interest as works of art—for instance, the works of Benvenuto Cellini, Lucca della Robbia and his son, John of Bologna, Fischer, Loudin, Oudry, &c.; but also from the works of others, still greater masters, whose genius and works had an immense influence upon the direction of taste as Raphael, Guilio Romano, Michel Angelo, Bernini, Lucca Giordano, and other men in Nurnburg and the Netherlands, who, although artists of the first rank, did not disdain to exhibit the most lively interest in the improvement of art workmanship.'

Officers were specially directed by the Government to examine and report upon the collection. Valuable and interesting reports were published, setting forth the com-

pleteness and great utility of the undertaking. In one of these reports is the following description of the Museum :—

"The collection perfectly corresponds with the aim of the founder. The exhibition of each particular class of subject separately, proves that the arrangement and classification is not made after the plan of an antiquary, but upon the principle of a technical collection of industrial art. It is arranged with a rare insight into technicality, a great knowledge of the works themselves and their component materials. Two subjects of the highest importance for the interests of Silesia—pottery and glass—are illustrated by objects which might be placed amongst the most distinguished productions of art.

"The works in leather carpets raised with gold and colour are of great interest. The examples of bobbin lace of great value and rarity, have been preserved in good condition nearly 300 years.

"The works of pottery and glass merit great attention and manifest that degree of perfection which is the result of the combination of art with technical skill. Amongst the examples, every kind of glass is to be found, of glass-melting and refining; every composition and mixture of clay—from the earliest Venetian glass to the productions of the last century—from the earthern vessels and porcelain of the Chinese and Japanese to the earthern utensils of the Germans—from the marjolicas of the Italians and the Wedgewood ware of England and the pottery ware of Silesia.

"The collection begins with the works of the simplest form and composition, and leads on to the most artistic productions. Every kind of vessel is represented; turned with the hand on the round plate, moulded by hand, or in models, glazed or natural, enamelled or ornamented in colour, from the most insignificant potsherd, to vessels of the most gorgeous pattern and design. The purpose of technical instruction appears still more in a collection of fragments of antique glass vessels and materials. These fragments are quite proper for mechanical investigation, and, examined with intelligence, will surely unfold many enabled the ancients to attain such high perfection. The things which are mysteries to us, the knowledge of which same may be said of the works in pottery."

We proceed now to describe the collection as it exists at this moment, according to the arrangement of the founder. and in the order in which it should be visited and studied.

FIRST DIVISION.

This division of the collection relates to the products of industry, and has three compartments, one devoted to articles produced from the mineral, another from the vegetable, and the last from the animal kingdoms. In the first compartment are represented the working in stone, in metal, in glass and clay; the fashioning of stone, and the manipulation of clay; the metal formed with the hammer and by the chisel and graver. Here may be studied the works of the locksmith, armourer, sword-cutler, gunmaker, spurmakers, as well as the artizans in nobler metals. Bricks, building ornaments, hollow vessels of all ages, and every description of the manufacture of glass, hollow glass, coloured glass, imitation of stone, &c. The next compartment represents vegetable stuffs: the application of woods, leaves, fruits, and fibres, from the simplest manufacture to the finest mosaic; the application of bark first as clothing of savages, and then as works of beauty produced by the loom; the adaptation of refuse shreds for the fabrication of paper, and papier maché; and lastly, specimens of wood-cutting and typography.

The last compartment exhibits the products from the animal kingdom. Raw hides and the finest specimens of stamped leather, articles of bone, ivory, mother of pearl, whether for domestic use or as specimens of art workmanship; specimens of woven and embroided hair, of the production and manufacture of silk, and of ornamenting with feathers.

SECOND DIVISON.

This division is again divided into three compartments, representing the classical, middle-age, and modern periods.

In the classical sub-division the walls represent the architectural and decorative arrangements of the Egyptians, Greeks, and Romans, by views of some of their most celebrated temples. Architecture is represented by a series of models—of the pyramids of Eygpt, the Temple at Tivoli, the Arch of Severus at Rome, and others. To illustrate the ancient art of building, materials are arranged, as fragments of columns, friezes, and ornaments, some of marble, some of burned clay; bricks, roofing tiles, pavements, and mosaic works; marble and plaster busts, and, lastly, there is a collection of gems showing the perfection of handiwork in the polishing and engraving of precious stones.

Next are arranged specimens of pottery and terra-cotta, from the Egyptians and Greeks, to the decline of art-specimens of the glass fabrics; then of metal wares and bronze castings, and lastly, in this compartment, manufactures of animal and vegetable substances are exhibited, as carved works in wood and ivory, and textile fabrics, even the finest productions of Byssus, which have braved a thousand years.

The next sub-division is devoted to the middle age. A considerable space is occupied with this collection. While in the last sub-division the works for satisfying luxury and the pleasures of life are most prominent in number, importance, and from their exhibiting the finest taste and the highest practical science, here is to be observed the decline of taste, then the power of the hierarchy, and at last the long and painful, but victorious struggle of the revival of purer art. First in arrangement are the sacred utensils of Divine service, and instruments of war, carved altars, richly gilt and decorated; examples of brickwork, and fine ornaments of Lombard buildings of the 14th and 15th centuries, amongst them the works of Antonio Filarete, and of Robbia. Groups and trophies of the works of the armourers, locksmiths, spurriers, &c.; panes of glass from the Cathedrals of Milan and Cologne, and the great workshops of North and South Germany, the Netherlands, and Switzerland. Carpets which decorated the floors and walls of churches and palaces.

In niches stand sarcophagi and altars. In the centre of the room rises a column of marble surmounted with the statue of the virgin, a Neapolitan work of gilt clay. Around the room are chairs with splendidly embossed leather fittings, carved confessionals, and varieties of mosaics of the best masters of Italy. Upon tables are arranged products in clay, the Arabic and Spanish Marjolicas, and Italian imitations of them and a collection of Italian state glasses of the most excellent workmanship.

Between this and the next subdivision, are exhibited those subjects which properly belong to a period between the classical middle age and the modern time, examples of the so-called *renaissance*.

The last subdivision isappropriated to the modern age. The ceilings are after Raphael, from the Vatican. The doors are ornamented with caryatides and friezes of the Venetian masters of the 15th and 16th centuries. The walls are hung with Gobelin tapestries. Carved wooden chests, one by Baccio Bandinelli, enriched with reliefs. Marble reliefs by M. Angelo; clay statues by Lucca della Robbia, and other works by Stucco and Sgraffito, after M. Angelo and Raphael. Upon tables and upon shelves, are arranged master works of Italian pottery of the 15th and 16th centuries, from the workshops of Pesaro, Eubio, Urbino, &c., who followed the design sof Raphael in vases, dishes, plates, and other vessels; enamels and vessels of the highest degree of perfection in glass; gems, and mosaics.

A compartment is next devoted to the period which immediately followed the discovery of America, to the commencement of the thirty years' war. German industry is here illustrated from the workshops of Nurnberg,

of Augsburgh, of Cologne, and of Bohemia. The doors are enriched with hunting emblems and arms. Groups of arms and trophies are hung round, testifying to the perfection of the smith, the cutler, and the chiseller; specimens of the tools and implements used by artists and workmen, and instruments employed in navigation and in the study of astronomy. Specimens of pottery and of glass, and of the art of the joiner and other handicraftsmen, are here exhibited, as also portraits of the most noted travellers of the time.

A very complete arrangement of Chinese porcelain comes next in order, also of Japanese porcelain; near them the European imitations, partly after their models, partly after the Marjolicas, and the designs of the Netherland potters—then finer works, with reliefs of hunting scenes and groups—then the endeavour to improve in modelling and arrangement of figures. Examples are also shown of the attempts to produce a clay equal to the Chinese porcelain. Also specimens of the products of this class of Venice, Germany, Bohemia, England, &c. Here are also mosaics, metal works, carved wood, ivory, mother of pearl from the workshops of Venice. The produce of the needle and loom are represented by stuffs from China, Japan, India, Persia, Arabia, and Turkey, of great beauty and splendour, and by tapestries from Gobelin.

Another compartment is appropriated to the period from the commencement of the 18th century to the French Revolution, with its decline of taste, but important discoveries in science and art. Furniture mirrors, consoles and pictures, carved wood and ivory marqueterie and Rococo exhibit the overloaded decoration of the period. Here is to be seen an interesting series of European porcelain, beginning with the experiments of "Böttcher" and the white Saxon porcelain to the perfect works of Kändler and the end of the period; fine specimens of Berlin porcelain, and some excellent works from Sevres; examples of Wedgwood ware, from the full size bust and vase to the smallest relief and vessel. Around the room are specimens of fine works in bronze, ivory, and the finer metals, and a large collection of glass; crystals and state glasses from the workshops of Venice, Germany, England, and Bohemia; mirrors and looking glasses; ornaments in feathers and shells, &c., &c.

This concludes the industrial collection,—a faithful picture of the immense abundance of the products of the human mind, and of its power of production in the field of art-workmanship, and ample materials for studying new combinations.

There are, however, other rooms for the exhibition of works of art, as pictures, miniatures, engraving, &c. Among them are works of Raphael, Boltraffio, Guilio Romano, B. Garofalo, Guido Reni, Guercino, Andrea del Sarto, Michel Angelo, Caravaggio, Schidone, Titian, Paolo Veronese, Padovanino, C. Maratti, Albano, Poussin, S. Rosa, Rubens, Vandyk, Van du Helst, Lely, Van Helst, Le Brun, Jacques Von Artois, F. Clouet, Murillo, Velasquez, Q. Mastys, Wohlgemuth, Solzius, and L. Kranach. In these rooms is arranged a collection of examples of the latest works of industry which have been produced under the influence of the fine models of antiquity.

AGRICULTURAL STATISTICS.

SIR,—As I was unable, from previous engagements, to take a part in the adjourned discussion last evening on Mr. Leone Levi's valuable paper on Agricultural Statistics, I venture to ask permission to make a few remarks through the medium of your Journal. I should hardly think it necessary to refer to the importance to the farmer as well as to the public of a good system of Agricultural Statistics, were it not for some remarks which fell from some of the speakers, who seemed to question their appreciation of it, and to express a fear that difficulties would arise from a prevailing idea that the information was desired for some purpose of taxation. This feeling I believe to exist with many, and it is not to be wondered at, for it is a lamentable reflection that, from the days of the Romans up to the present time the statistical information that has been obtained upon industrial subjects has been not so much for the purposes of improvement, of science, or of benefitting the public, as for the purpose of seeing what amount of taxation they would bear. In the days of Imperial Rome we read that the land was accurately measured by proper officers, who reported its produce, whether arable or in pasture—in vineyards or in woods; the number of cattle, and the number of slaves—and an average estimate was made of the gross produce for five years, of which a fixed portion was exacted by the State. This was, probably, the origin of the Agricultural Survey which was carried out by William the Conqueror, and is still to be seen in that valuable and curious register of the time—the "Doomsday Book."

This Statistical Survey appears to have been used for the same purpose; and since that time up to the present day, like results have generally followed like inquiries. Notwithstanding this probable cause of hesitation with the farmers generally, I am inclined to think that, on a little consideration, they will see their own interests so directly concerned in the inquiry, that less difficulty in the prosecution of it will be met with from them than from a higher class of those connected with land. This belief is strengthened by my own experience, to which I shall presently allude, and also by the tone of the recent discussions on the subject which have taken place at the Royal Agricultural Society and at the Farmers' Club. Valuable as correct information is in reference to every manufacturer or dealer in manufactures, it becomes doubly so when it affects a subject of such importance as the food of the people. Nothing tends so much to counteract the great fluctuations of the market, and to keep corn at an equable price as legitimate speculations, and this can never be carried on safely to the individual and with benefit to the public, unless upon the sound basis of statistical facts. It has been remarked that individuals have, by inspecting the growing crops, collecting information, and comparing and registering their observations, been able to deduce certain estimates, and then use them successfully as the basis of subsequent transactions. These statistics, incorrect as they may be, are found to be better than none. They are not influenced by political or theoretical views, but solely commercial—founded upon a simple view of facts, regulated and strengthened by experience. If we look back, we find that most of the great fluctuations in prices have arisen more from the influence of a want of correct statistical information upon commercial speculation than upon the fact of an abundant or a scanty harvest. There is much curious and valuable information on this point to be gleaned from the early history of our markets, as recorded by Stowe, and also by Tooke "On High and Low Prices." In 1813 the crop was of the most abundant character; in 1814 it was a full average; in 1815 again very abundant; but in 1816 it was most calamitous: the excess, however, of the three preceding years being in store, lessened the scarcity which would have occurred in 1817 if the produce of the last harvest had been all that there was in the country. As it was, the legislation (corn law) of the preceding year (1815) was suspended, and the ports opened for the admission of foreign corn without restriction or duty. The evil had, however, been done; in the absence of any correct statistical knowledge it had checked the tendency of commercial speculation in grain. The intermediate possessors of wheat were lessened, so that a very small deficiency raised the prices enormously, as was seen in 1817, when the price rose from 70s. to 130s. per quarter, while a small surplus in 1822 depressed it to 38s. per quarter.

Let not my meaning be prejudiced by the ordinary acceptation of the word *speculation*. I wish to use it merely as implying the intermediate possession of corn between the producer and the consumer, whether it be by the mer-

chant or by the farmer; for I hold that a farmer who keeps his crop over a second harvest does so in the hope of a better market, and thus leaves the legitimate part of farming for that of speculation. We are indebted to Adam Smith for our knowledge of the true philosophy of commerce. His views of the principles of productive and distributive industry carry conviction with them, by the force and yet simple form of his arguments. Since his time statistical knowledge has gradually been increasing in importance until it has arrived at its present position—a pure deductive science. Its application to agriculture, the immediate subject of our discussion, may be seen in the "Statistical Account of Scotland," the result of a series of simultaneous inquiries into the land in cultivation, and its produce, the clergy contributing the account of their respective parishes. These were all sent up to Sir J. Sinclair, who superintended their arrangement and publication. The next movement seems to have taken place in 1816 and 1817, when "An Inquiry into the Agricultural State of the Kingdom" was instituted in a statistical form, by the Board of Agriculture. In 1832 a Statistical Department was established at the Board of Trade. In 1833 a Statistical Section was formally acknowledged at the British Association meeting. In the same year a Statistical Society was organised at Manchester, and in the year following the Statistical Society of London was established, having originated in the successful result of the Statistical Section at the meeting of the British Association, at Cambridge. At these meetings, the importance of agricultural statistics has frequently been discussed. In 1834, Lord Fitzwilliam, at the Edinburgh meeting, observed "that *accurate* information, from even a small number of places, would furnish more safe grounds for correct inferences than could be obtained from a more widely extended, but less precise inquiry."

In 1849, Mr. Danson, (Birmingham meeting) in a paper on "Agricultural Statistics, and Fluctuations of Prices of Wheat in France," gives it as his opinion "that the history of prices (especially as regards the food of the people) ought, in the order of practical importance to mankind, to take precedence of the history of politics." I could quote from several other papers of the same character if my time and your pages would permit. I must, however, leave these few and somewhat irregular observations in reference to the importance of agricultural statistics, and venture a few remarks on what passed at the first evenings discussion, as to the mode of carrying them out.

I fear, with Mr. Sidney, that the proposition of sending Commissioners round the country to persuade the farmers into a favourable view of the Government measure, would excite their suspicions rather than their assistance. At the same time, I think much valuable information as to details might be obtained by some such mode of application to the provincial market towns—say those in which the corn averages are struck. They might be taken as the centres of dispersion for their respective districts. With most of Mr. Caird's observations I quite concur, especially those in reference to the importance of *correctness* and *exactitude*. Upon this point Lord Fitzwilliam's paper also bears. If he, as an individual, could do it on a limited area, it surely cannot be difficult to organise machinery equal to more extended operations. As regards his (Mr. Caird's) proposition, that a knowledge of the breadth sown with any particular crop will give the earliest and most reliable indications of what produce may be expected, I hope I may, without any impropriety, allude to some inquiries of my own, which were made last year, and which strongly confirm his proposition. In an industrial tour to the north, in the early part of the spring, the condition of the crops was one of the principal objects of my inquiry, and the results I obtained appeared to me so important that I felt it my duty immediately on my return to communicate them to the President of the Board of Trade. On inquiry into the breadth sown in wheat in the different corn-producing districts through which I passed, I was led to the conclusion, that the area sown was, on an average, from one-third to two-fifths *less* than that of ordinary years; while the wet and ungenial weather of the previous season had had such a debilitating effect upon that which was sown as would probably reduce its yield from 5 to 10 per cent. Thus, it appeared to me that we should have to meet a deficiency in our harvest of about 40 per cent. upon our ordinary returns. This communication was made on the 20th March—how far my estimate proved correct we unhappily know too well. Mr. Caird's suggestions, as to the machinery to be employed and the details of working it, I think are open to serious objections. If the inquiry is of that vital importance which I believe it to be, it appears to me that it should be conducted by a special department, with machinery of the best character, and specially adapted to its particular requirements, rather than be tacked on to any other branch of the public service, especially one which carries with it a title so little grateful to a farmer's ear as that of the *Tithe* and Inclosure Commission. The *first* consideration in such an inquiry is, that it be *efficiently* and accurately carried out; the question of expenditure is a secondary consideration, and I should be inclined to think Mr. Caird's estimate far below what such an inquiry would amount to. On one other point in his details—the relation between productiveness and locality and climate in any particular season—I would remark, that some observations were made, during twelve successive years, in reference to the causes, whatever they may be, affecting productiveness, and it was found that, taking one year with another, they were pretty equally distributed over the whole of England. Thus, the same years which show the maximum production in Durham and Northumberland were found to yield the largest returns in Somerset and Hampshire, and the years that were least productive in the South and West showed a like deficiency in the North. From the suggestions of Mr. Jadis I am sorry to have to differ on all points. 1st. The clerks of Union Boards are lawyers, and ill calculated, both by professional pursuits and habits, for the duties suggested. 2nd. The parochial clergy have happily other and more important duties to perform, which ought to fully occupy their time; and 3rdly, the mode proposed of working and remunerating paid Inspectors I cannot think at all likely to secure the object desired; the payment, £50 per year for the responsible survey and registration of 50,000 acres, surely should never be attempted. At the same time, I think the suggestion of defraying the whole cost by a charge on the county rates, would meet with general dissent and opposition.

Thus far, I have ventured freely to comment upon the suggestions of others, without bringing forward any myself; want of time rather than want of inclination has been the cause. As a proof of my intentions I may mention, that I had made some *practical* progress in the matter, in the spring of last year, when I was unexpectedly honoured by being appointed an Industrial Commissioner to the United States. This took me from home, and prevented me from the attempt which I was about to make, on *my own responsibility* and *at my own cost*, to obtain the statistical account of each acre comprised in the Union in which I reside. It would have been a fair test of what could be done, both as regards work and cost, as the Union contains 19 parishes, all of which are purely agricultural.

In conclusion I would call attention to a fact which seems to have escaped the notice of all those taking part in the present discussion—namely, the proportion of our supply of food for which we have to rely upon the produce of other countries.

I have no figures before me to quote from, but must use round numbers, which will, in the absence of reliable statistics, perhaps be the best. Under the most favourable circumstances, we only grow a quantity of wheat equal to five bushels per head of our population; whereas the consumption amounts to eight bushels; and we con-

sequently have to purchase three bushels per head from other sources. In the case of a deficient harvest like the last, the figures are changed. We only grew three bushels, and had to import five bushels. Surely this ought not to be overlooked in the organisation of our new statistical department. In this age of progress—of steamships, steam roads, and electric telegraphs, space is almost annihilated. The material of Europe is brought within the compass of a week, and its knowledge within that of an hour—the influences that affect the markets of one country are felt in the markets of the other. This is a subject worthy of provision in our new arrangements. In 1825, the Government of the day sent out a special commissioner for the purpose of enquiring into the agricultural capabilities of the great wheat-producing districts in the North of Europe; and the same gentleman. Mr. Jacobs, was sent in 1827 and 1828, on a similar mission to the other Continental states of Europe. If it was desirable then to obtain such information, how much more so must it be now, when the acres from which we draw our principal supplies are marked by the heel of the armed soldier instead of the peaceful ploughman. There can be no harvest where no seed is sown, and few will sow where there is no chance of reaping in peace.

I must plead for some indulgence for any errors in these hastily written observations, which I am anxious to have ready for your Journal of this week, so that they may appear with the adjourned discussion.

I am, Sir yours faithfully,

JOHN WILSON.

Ivar, Bucks, April 6th.

INSTITUTION BUILDINGS.

Mechanics' Institute, Royston, Herts.
3rd April, 1854.

SIR,—Your journal is especially valuable as a vehicle for making known the *wants* of institutions.

In order that we may the more efficiently fulfil our mission, we are endeavouring to raise 1,000*l.* for the erection of a building, to contain a large hall for lectures, entertainments, &c., with rooms for a museum, library, reading, class instruction, &c, a matter of no small difficulty in a town with a population of little more than 2,000.

It becomes, then, a question of the greatest importance to us—how can we most advantageously spend 1,000*l.* in the erection of a building?

The choice of *materials* for building must be regulated chiefly, we apprehend, by the resources of the locality.

Our chief difficulty, which we press upon the attention of your readers, is with respect to the large hall; for we are anxious not only to provide a room suitable for lectures and entertainments, but also for public meetings, such a room being a desideratum in our town. The superficial area of the large hall, must be at least 1,800 square feet. What is the best proportional size for a room to be used for such a variety of purposes? Some persons stoutly advocate the *double cube* shape, as being the best for good acoustical effects, viz:—For the room we want, 60 feet long, 30 feet broad, and 30 feet in height. We really should be glad to learn the experience of some of your readers on this point.

With us, the large hall and its ante-room would occupy one floor, and the remaining rooms another floor. Should the large hall be on the ground-floor, or *above* the other rooms? If above, which is to be preferred—the plastered ceiling or the open wood roof?

You see then, sir, we seek information on the best proportional size, the position in the building, and the best kind of roof, for a large hall. We earnestly solicit your readers to aid us, either through the medium of your journal, or by private letter if preferred.

We are not aware of any work on the subject, except a valuable one by the Messrs. Papworth, on "Museums, Libraries, and Picture Galleries;" this, however, does not aid us much, for it has reference to buildings of greater magnitude than the one we contemplate.

In conclusion, we venture to suggest that the Society of Arts collect detailed information from the Institutions in Union, respecting their buildings, to guide those who, like ourselves, being without a building, are resolutely determined to raise money for the purpose, and feel anxious wisely to expend the same.

I remain, Sir, truly yours,

JOHN WARREN, Hon. Sec.

To Correspondents.

ERRATUM.—In last Number, col. 1. line 22, for G. Gore, *M.D.*, read G. Gore.

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Mr. W. H. Monk, "On Chamber Music."
Statistical, 8.—Mr. John Angus, "On the Movement of the Population; Mortality and Fatal Diseases in London in the last Fourteen Years."
Geographical, 8½.—1. Lieut. Col. Lloyd, "Account of an Expedition to the Sources of the Amazon." 2. Capt. S. B. Haines, "Variations of the Magnetic Needle at Aden." 3. Dr. G. Buist, "Physical Geography of the Red Sea."
TUES. Syro-Egyptian, 7½.—Dr. W. Camps, "On the Intellectual Character and Habits of the Arabians, as for the most Part displayed in the Makamat of El Hariris of Basia."
Civil Engineers, 8.—Discussion "On the Management of Engine Furnaces, with a View to the Prevention of Smoke."
Medico-Chirurgical, 8½.
Zoological, 9.
WED. Literary Fund, 3.
Society of Arts, 8.—Dr. Forbes Royle "On Indian Fibres."
Graphic, 8.
Astronomical, 8.
Ethnological, 8½.
Pharmaceutical, 8½.
Archæological Association, 8½.
Royal Society of Literature, 8½.
THURS. London, 7.—Mr. C. Cowden Clarke, "On the Novel Writers of Europe."
SAT. Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 30*th March*, 1854.

Par. Numb.
84. Metropolitan Sewers—Reports from the Engineers.
127. Court of Chancery—Returns.
129. Arctic Expeditions—Copy of Letter.
132. Schools (Ireland)—Return.
55. Bill—Registration of Bills of Sale.
Eastern Papers—Part 7.

Delivered on 31*st March*, 1854.

139. Railway Bills—Copy of the Report of the Board of Trade.
54. Bill—Mortmain.

Delivered on 1*st and* 3*rd April*, 1854.

57 (2). Trade and Navigation—Accounts.
115. Poor Law (Scotland)—Return.
122. Metropolitan Commission of Sewers—Return.
44. Local Acts—Reports from the Admiralty.
35. Bills—Merchant Shipping.
36. Bills—Merchant Shipping Acts Repeal.
Oxford and Cambridge Universities (Snell Foundation, Balliol College, Oxford)—Correspondence, Part 4. Supplement to Part 1.
Railways—Reports upon the Principal Accidents.
Railways—Reports of the Inspecting Officers upon certain Accidents.
Turnpike Trusts—Second Report by the Secretary of State.

Delivered on 4*th April*, 1854.

117. Newspaper Stamps—Return.
128. Metropolitan Improvements (Advances out of the Consolidated Fund, &c.)—Statement.
121. Tithe Commutation—Returns.
Agricultural Returns of Ireland for the year 1853.
Public General Acts—Cap. 1, 2, 3, 4, 5, and 6.

Delivered on 5*th April*, 1854.

135. Islands of Arran—Copy of Correspondence.
140. Land Tax—Return.
142. Brevet Promotions—Return.

144. Beer, Spirits, &c.—Return.
146. Messrs. Martin and Co.—Copy of Correspondence.
130. Gibraltar—Returns.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, March 31st*, 1854.]

Dated 27th February, 1854.

475. R. A. Brooman, 166, Fleet street—Tin foil. (A communication.)

Dated 3rd March, 1854.

517. J. A. Boyle, 29, Alfred place, Bedford square—Crushing or reducing to powder, pulp, or wash any matter.

Dated 7th March, 1854.

543. J. Johnson, Leatherhead—Stop for railway carriages.

Dated 11th March, 1854.

589. J. Maynard, Drury lane—Pianoforte strings.
591. J. Wright, Manchester—Sugar manufacture. (A communication.)
593. W. Symington, Gracechurch street—Heating air.
595. J. H. Johnson, 47 Lincoln's inn fields—Lighting. (A communication.)
597. J. Buchanan, Leamington Priors—Propellers.

Dated 13th March, 1854.

598. L. Whitaker, J. Diggle, and G. Howarth, Haslingden—Spinning cotton.
599. J. H. Johnson, 47, Lincoln's inn fields—Cannon. (A communication.)
600. B. Latchford, St. Martin's lane—Saddlery.
601. J. Glenny, 152, Strand—Camp bed.
602. E. Haeffely, Radcliffe—Mordaunt for dyeing and bleaching.
603. E. Haeffely, Radcliffe—Stannates of soda.
604. J. Wright, 16, Park street, Kennington—Furnace for consuming smoke.
605. J. Walker, City road—Raising stamps for crushing, and rams for pile driving.
606. G. Hopper, Houghton-le-Spring Iron Works—Pins for railway chairs.
607. J. H. Johnson, 47, Lincoln's inn fields—Sewing machines. (A communication.)
608. A. E. L. Bellford, and P. Riston, 16, Castle street, Holborn—Inflating life belts, &c. (A communication.)

Dated 14th March, 1854.

609. F. Russell, Clarence gardens, Regent's park—Clearing obstructions on railways.
611. J. H. Swan, Glasgow—Drying bricks, &c.
613. J. Woodford, Hatton garden—Smoke consuming grate.

Dated 15th March, 1854.

615. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Waterproof stuffs. (A communication.)
617. T. Kaye, Huddersfield—Manufacture of gas.
619. J. P. Oates, Lichfield—Bricks, &c.
621. J. Houston, jun., Glasgow—Steam-boilers.
623. W. Weatherley, and W. Jordan, Chartham, near Canterbury—Steam boilers.
325. T. W. Keates, Chatham place, Blackfriars—Turpentine and drying oils.
627. M. Binns and J. Pollard, Bradford—Combing wool, &c.

Dated 16th March, 1854.

628. C. Poisson and L. J. Martin, Paris—Printing fabrics. (A communication.)
629. B. Weare, Plumstead common—Galvanic batteries.
630. D. Bethune, Toronto—Steam vessels.
631. F. W. Emerson, Penzance—Pulverizing, &c., gold quartz.
632. J. Kavanagh, Liverpool—Sails.
633. J. Lilley, Birkenhead—New material for spinning, and for manufacture of felt.
634. J. G. Marshall and P. Fairburn, Leeds—Combing flax, &c.

Dated March 17th, 1854.

625. J. Gerrard, Guernsey—Cutting and stamping soap.
636. W. Holt, Bradford—Organs.
637. R. W. Harris, and T. Patstone, Birmingham—Lamp shades.
639. T. W. Scott, Plymouth—Devonian limestone.
640. A. Hendry, Port Glasgow—Bakers' ovens.
641. G. H. Barth, 4, Mornington crescent, Hampstead road—Administering gasses for certain diseases.
642. T. Bassenett, Liverpool—Ships' compasses.
643. J. Hughes, James street, Bethnal green road — Jacquard machine.
644. G. W. Reynolds, Birmingham—Stays.
656. J. Hyde and J. Harper, Stockport—Spindles and flyers for roving machines.
647. W. Thorne, Barnstaple—Reducing metallic ores.
648. W. Dantec, Liverpool—Purifying water.

Dated 20th March, 1854.

650. P. R. Hodge, Moorgate street—Reducing metallic ores.
652. R. Tempest, J. Tomlinson, and H. Spencer, Rochdale—Cleansing wool.
654. H. Moore, Junction Foundery, Hull—Template for iron ship building.
656. F. Loret, Vermeersch, Malines—Looms.
660. J. Longbottom, Leeds—Combining air with hydro-carbons. (A communication.)
662. J. Perkins, Kennington—Metal blocks for printing fabrics.
664. R. A. Brooman, 166, Fleet street—Sewing machines—(A communication.)

Dated 21st March, 1853.

666. J. D. Pfeiffer, Paris—Bookbinding. (A communication.)
668. J. Polson, Paisley—Starch.

Dated 22nd March. 1854.

670. A. V. Newton, 66, Chancery lane—Japanning leather. (A communication.)
672. J. Sheringham, Edwardes square, Kensington—Kettles.
674. G. Sterry, Worcester—Mouldings.
676. T. S. Watson, 444, West Strand—Railway traverser.
678. J. H. Robinson, Hebden bridge—Steam boilers.
680. R. O. White, Swanscombe—Portland cement.

WEEKLY LIST OF PATENTS SEALED.

Sealed April 1st, 1854.

2244. Edward Davies, of Bradford—Improvements in carrier-combs to be used in combing wool, cotton, silk, flax, or other fibrous substances.
2255. William Joseph Thompson, of North Shields—Improvements in heating reverberatory and other furnaces.
2273. John Wright, of Rochester—Improvements in apparatus to facilitate the landing and embarking of passengers from steam-boats and other vessels.
2304. Henry Kraut, of Zurich—Improvements in stands for casks and barrels.
194. Thomas Wicksteed, of Leicester—Improvements in the manufacture of sewage manure, and in apparatus for that purpose.

Sealed 4th April, 1854.

2274. James Thomson Wilson, of Falkirk—Improvements in the manufacture of alum.
2279. John Mason, of Rochdale—Improvements in preparing cotton for spinning, and in machinery or apparatus for effecting the same.
2282. Julius Schonemann, of 89, Great Portland street—New constructions of weighing machines.
2780. James Alexander Manning, of the Inner Temple—Improvements in the treatment of sewerage and other polluted liquids and the products thereof.
3022. Alfred Vincent Newton, of 66, Chancery lane—Improvements in the manufacture of screws.
10. David Kennedy, of Reading, U.S.—Certain compositions of matter to be used in the manufacture of leather.
88. William Edward Newton, of 66, Chancery lane—Improved machinery for dyeing, washing, and bleaching fabrics.
142. Robert Angus Smith and Alexander M'Dougall, both of Manchester—Improvements in treating, deodorizing, and disinfecting sewage and other offensive matter, which said improvements are also applicable to deodorizing and disinfecting in general.
166. John Getty, of Liverpool—Improvements in the manufacture of tubular bridges, part of which improvements is applicable also to the preparation of plates for covering iron ships, for constructing boilers, and for other analogous uses.
186. William Edward Newton, of 66, Chancery lane—Improvement in violins and other similar stringed musical instruments.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854. Jan. 30.	3583	Table Knife	Charles Ward	69, Ecclesball road, Sheffield
" 31.	3584	Lath with Grove and Sliding Balls for carrying Curtains	Thomas Taylor	49, Coney street, York
" "	3585	Door Shutter	William Conrads	5, Southbank st. St. John's wd. Londo

Journal of the Society of Arts.

FRIDAY, APRIL 14, 1854.

TRADE MUSEUM.

The Council desire to call the attention of the Institutions in Union to the following Circular, believing, that the subject to which it refers is one in which they will take considerable interest, and can render material assistance:—

Sir,—Her Majesty's Commissioners for the Great Exhibition of 1851 having, conjointly with the Society of Arts, appointed me to commence the formation of a General Collection of the raw Produce and Manufactures of all Countries, as se forth in the Second Report of the Royal Commission, I am now occupied in forming a collection of raw and manufactured Animal Produce of every description; and I am, therefore, desirous of inviting the aid and co-operation of all who are interested in the pursuits of Trade, Commerce, and Manufactures.

The Collection, with the formation of which I am thus charged, will contain samples of the Produce of Great Britain and Ireland, the British Colonies, and also of all Foreign Countries. It will hereafter be arranged and exhibited in the most convenient and instructive manner; and, when complete, will represent the productive resources of each country, accompanied by such statistical and scientific information as may be desirable.

The object of the present circular is to invite Producers, Merchants, Manufacturers, and others, who are disposed to aid, by contributing samples of raw or manufactured animal produce to the Trade Museum, to communicate with me on the subject. The specimens should in all cases, if possible, be accompanied by written descriptions, stating where from, by whom produced, collected, or manufactured, the cost of production, collection, or manufacture; and should be forwarded to me at the Society's House. It is hardly possible to specify exactly the best size for each sample; the collection is formed for practical use, and therefore each specimen should be large enough to show the distinguishing characters or properties of each article in a clear and satisfactory manner. Specimens of all kinds of animal produce will be valuable, whether at present used in the Arts or not. Samples of the same articles showing peculiarities of manufacture, nature, or preparation, or derived from different sources or localities will also be received, as it is an essential feature in the collection now forming, that the productions of different countries or localities shall be contrasted and shown side by side.

Yours, &c., EDWARD SOLLY.

The following list is by no means complete, and migh be very considerably extended; it is merely given asa nt indication of the class of articles which are desired:

Alpaca.
Ambergris.
Animal Charcoal.
—— black.
Antelope fur.
Angora Goat do.
Axminster carpets.
Bats' Guano.
Badger fur.
Balzarine.
Bandanas.
Bareges.
Beaver skins.
Bear do.
Beaver hats.
Bezoar stones.
Beetles' wings.
Birds' skins.
Bird of Paradise feathers.
Bladders.
Blood (dried).
Blankets.
Bones.
Bone black.
Bristles.
Brussels carpets.
Broad cloth of all sorts.
Butter (preserved.)
Buffalo fur.
Buck skin.
Buffalo tails.
Cameo shells.
Catgut.
Carmine.
Caviare.
Castoreum.
Cantharides.
Cats' fur.
Calf skins.
Camels' hair.
Carpets of all kinds.
Candles.
Cassimeres.
Cashmeres.
Calimancos.
Camlets.
Chinchilla fur.
Chenille.
Civet.
Cow hair.
Corahs.
Coral.
Cochineal.
Coprolites (fossil).
Cock feathers.
Cod-liver oil.
Cow hides.
Cocoons.
Cobourgs.
Crow quills.
Crabs' eyes.
Crapes.
Cuttle fish bone.
Damasks.
Deer skins.
Down.
Dog-fish skin.
Dog-fish oil.
Dog skin.
Doe skin (cloth).
Ducks' feathers.
Eagle feathers.
Egg albumen.
Eggs of all kinds.
Eider ducks' skin.
—— down.
Elephant skin.
Emu feathers.
Embossed leather.
Eneua 'Orient.
Ermine.
Feathers of all kinds.
Felt carpets.
Fitch fur.
Fish skin.
Flannel.
Flock papers.
Fox skins.
Fur of all kinds.
Galls.
Gall-stone.
Gauhes.
Gelatine.
Glue.
Gloves.
Goldbeaters' skin.
Goats' fur.
Goats' skins.
Goats' fat.
Goose quills.
Grenatine.
Grebe feathers.
Guano.
Hare skins.
Hair of all kinds.
Hair cloth.
Harness.
Hens' feathers.
Heron feathers.
Hides of all sorts.
Horse tails.
Horse hair.
Horse oil.
Horse skins.
Horns of all kinds.
Hoofs of all kinds.
Honey.
Hogs' lard.
Hogs' skin.
Huanaco wool.
Ibis' feathers.
Isinglass.
Ivory.
Jays' feathers.
Kermes.
Kid skins.
Kidderminster carpets.
Lard oil.
Lamb skins.
Lac.
Lac dye.
Lac wax.
Lace (coach).
Leather of all kinds.
Leopard skins.
Lion skins.
Llama wool.
Lastings.
Lynx skins.
Madrepores.
Meats (preserved).
Meat biscuits.
Merinos.
Milk (preserved.)
Mink skins.
Mother of pearl.
Monkey skins.
Mohair.
Moreens.
Mousseline de laine.
Musk.
Oil of all kinds.
Opossum skins.
Orleans cloths.
Ostrich feathers.
Osprey feathers.
Otter skins.
Ox hides.
Ox tallow.
Parchment.
Panthers' skin.
Paramattas.
Peacocks' feathers.
Pearls.
Penguin skins.
Pheasants' feathers.
Pinna silk.
Plush.
Portable soup.
Porpoise oil.
Porcupine quills.
Poplins.
Quills of all kinds.
Rabbit skins.
Reindeer hides,
Rhea feathers.
Rhinoceros horn.
Rhinoceros hide.
Ribbons of all sorts.
Russia leather.

Sable fur.
Saddlery.
Satins of all sorts.
Sepia.
Seal skins.
Seal oil.
Sea slugs.
Sea-horse ivory.
Serges.
Shamoy.
Shagreen.
Sharks' fins.
Shalloons.
Sheep skins.
Sheep's tallow.
Sheep's tail oil.
Shells.
Silk of all kinds.
Silkworms' gut.
Silk stockings.
Silk hats.
Silk lace.
Silk fringes.
Silks spun.
—— thrown.
—— sewing.
Silks, woven, of all sorts.
Silk damasks.
Skins of all kinds.
Snake skins.
Soap.
Sponge.
Spermaceti.
Sperm oil.
Spiders' silk.
Squirrels' fur.
Stearine.
Stuff goods of all sorts.
Sugar of milk.
Swans' skins.
Swans' quills.
Tallow of all kinds.
Tartans.
Tabinets.
Teeth.
Tigers' skins.
Tortoise shell.
Turkeys' feathers.
Tusseh silk.
Tweeds.
Twills.
Union damasks.
Vellum.
Venetian carpets.
Velvets.
Vicuna.
Wax.
Wash leather.
Whale bone.
Whale oil.
Wool of all kinds.
Wolf skins.
Woollen stockings.
Woollen fringes.
Woollen fabrics.
Woollen cloakings.
Woollen paper.
Zebra skins.

INDUSTRIAL PATHOLOGY COMMITTEE.

FIRST REPORT TO COUNCIL.

Gentlemen,—Your Committee appointed to take special cognisance of the subject of Industrial Pathology, or of the accidents, injuries, and diseases incident to various bodily employments, fully appreciate its importance and its intimate connection with those interests which it is the special duty of the "Society for the Encouragement of Arts, Manufactures, and Commerce" to promote. At the same time they cannot but feel that its difficulties are equal to its importance. Many portions of this vast field of inquiry have already been worked by able writers, and frequently investigated by Parliamentary Committees, but the practical results obtained have not been proportionate to the amount of zeal and ability displayed, or of labour bestowed, and its general features are still very unsatisfactory. Nevertheless, your Committee entertain a hope that some positive results may be obtained by bringing the Society's various means of action to bear on this question, in the efficient and practical manner which has rendered its intervention so successful in other similar matters, and they consider the present time, when the public mind is turned with increasing solicitude towards the physical and intellectual condition of the working classes, as peculiarly favourable for such a movement.

After duly considering various plans of operation, your Committee beg to propose the following:—

To select each year, for special and thorough investigation, a single trade or group of trades, or some particular kind of injury. Thus it is contemplated to devote the remainder of the present session, to as complete an inquiry as the means at the disposal of the Committee may permit, into the injuries to the eyes which unfortunately attaches to many industrial occupations. The draft of a circular to be issued in reference thereto will be found annexed to the present report.

It is also suggested that preparatory steps be taken for holding, in the course of the next session, either as a part of the ordinary annual exhibition of inventions, or separately, as circumstances may determine, a special exhibition of appliances for preventing or mitigating the accidents, injuries, and diseases to which the industrial classes in general are exposed in the exercise of their several callings. As it is desirable that such an exhibition should display not only contrivances which at present exist, but also, and even more especially, such new ones as the influence of the Society of Arts can obtain the production of, it will be expedient to publish, for the guidance of inventors, some time before the opening of the exhibition, say in September next, an explicit statement of those desiderata which are most needed; and, in the meantime, your Committee will collect such data as may enable them to draw up the said statement in as complete and suggestive a form as possible. With this view they have prepared the following memorandum, in the form of a series of questions, as the most convenient means for directing the attention of those who may read the present report to the points on which information would be most acceptable. It will be seen that some of these questions extend their aim beyond the production of materials for an exhibition, because the attention claimed for one portion of the subject will naturally be extended to others, and because, indeed, any well-authenticated facts or well-founded opinions in connection with any branch of the subject would be valuable for the Committee's future reports, or for insertion in the Society's Journal.

Your Committee place great and special reliance on being supplied with written communications, and, when the time comes, with articles for the Exhibition by the Institutes in Union, whose vast constituency comprises so many thousands of the most intelligent among the working classes, and of the most liberal and enlightened among their friends; but, at the same time, they would appeal for co-operation to all men of science and benevolence, who have had good opportunities for becoming acquainted with the "behind the scenes" of industrial life, and they trust that all who enjoy thankfully the comforts of civilisation will feel interested in the removal of sufferings embittering the labour by which those comforts are produced.

Blandford,
T. King Chambers, M.D.
J. Simon,
T. Twining, Jun.

Memorandum

Embodying in an interrogatory form a few points on which communications would be particularly acceptable.

A.—What trade or group of trades do you consider as most urgently claiming a special and thorough investigation, with a view to mitigating the physical evils involved in it?

B.—Can you furnish any contrivances, or illustrations of contrivances, for the Exhibition adverted to above, or point out sources whence such articles might be obtained?

C.—Can you furnish any details of a statistical nature, as to the number of cases, fatal or serious, which have occurred within the last three years in any department of industry with which you are particularly acquainted?

D.—Can you supply evidence of a medical nature as to the character of the injury or disease, and the manner in which it is produced, its premonitory symptoms, and the kind of treatment found most efficacious? These data would be particularly valuable in reference to branches of trade recently introduced, or of which the pernicious effects have been hitherto little attended to.

E.—Can you state what good or indifferent results have attended legislative enactments in these matters, and what further parliamentary intervention might be desirable?

F.—What part do you consider that the public at large might beneficially take in the movement, especially

in reference to the patronising of certain branches of industrial occupation commendable in a physical or a moral point of view, and discountenancing those recognised as injurious?

G.—Can you point out, in reference to the evils enumerated in the subjoined SYNOPSIS, or others of an analogous nature, any desiderata which you think particularly needed and feasible; and can you, at the same time, furnish any suggestive indications of the best way of accomplishing such desiderata?

SYNOPSIS

OF SOME OF THE PHYSICAL EVILS WHICH ATTACH TO VARIOUS KINDS OF INDUSTRIAL LABOUR:—

I. Injuries by sudden violence—

(a) Through defects of construction in scaffolding, vaulting or shoring.

(b) Through defects of protection against dangerous mechanical operations by hand, machinery, or otherwise; e. g. Adzes, unboxed machinery, splintering of masses, recoil of artillery.

(c) Through explosions of steam, fire-damp, gas, gunpowder, and the like.

(d) Through carbonic acid, sewer-gases, and the like; e. g. Brewers, sewer-workmen, sextons.

(e) Through casualties by water; e. g. In navigation by sea, rivers, and canals, in launching vessels, &c., to include all risks of wreck or drowning.

(f) Through extreme bodily effort; e. g. In carrying weight, and otherwise.

II. Chronic injuries to general health or to particular organs of the body—

(a) Through vitiation of air:—1. By overcrowding and non-ventilation of work-places. 2. By animal or vegetable decomposition. 3. By acrid or poisonous vapours, engendered in manufacturing processes, or in using certain products. 4. By admixture of dust, grit, or fluff; e. g. 2. All workers in animal refuse (glue-makers, &c.). dustmen, labourers in flax, rice, sugar, &c. 3. Acid and alkaline fumes, mercury, arsenic, phosphorus, copper, lead, &c. 4. Workers in cotton, flax, feathers; drug-grinders, millers, lapidaries, masons, grinders of steel instruments, polishers, &c.

(b) Through extremes of temperature; e. g. Founders of metal. glass-workers, stokers, cooks, watchmen, coast-guard.

(c) Through privation of daylight; e. g. Miners, night-workmen.

(d) Through the fatigue of excessive or untimely labour; e. g. Coal whippers, children in factories.

(e) Through working in water; e. g. Puddlers, dammers, fishers, brickmakers, treaders.

(f) Through irritating and poisonous contact with the skin; e. g. Grocers, bakers, sweeps, gardeners, washerwomen, plumbers.

(g) Through violence or infection from domestic animals; e. g. Farriers, cowkeepers, &c.; risks of glanders, hydrophobia.

(h) Through over-stress on particular joints, or over-fatigue in particular organs. especially those of sight, voice, and hearing; e. g. 1. Gunner's thumb, sail-makers. 2. Opticians, microscopists, needle workwomen, workers in glare (glass-blowers, smelters). 3. Cryers, trumpeters, preachers. 4. Gunners, hammerers, divers.

(i) Through labour in positions of constraint and tension, or with extraneous pressure on internal organs; e. g. Standing labour of washerwomen, &c.; sitting labour of tailor, &c.; riding of cavalry; epigastric pressure of cobbler.

CIRCULAR.

SIR—I am instructed by the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce, to communicate to you the accompanying Report of the Special Committee appointed by them to investigate the accidents, injuries, and diseases which attach to various bodily employments, and to devise means for prevention or relief. This object is so clearly for the advantage of both workman and master, producer and consumer, that ready help is confidently looked for from every class in carrying out the plan of operations detailed in the report. The favour of your co-operation is earnestly requested, both as regards the proposed steps for holding in the ensuing session an exhibition of inventions and appliances of all kinds for making handicraft employment more healthy, and also more particularly as regards the department of the subject which the Committee have selected this year for more immediate and thorough investigation, viz., *the Trades which affect the Eyes*, either

By exposing them to chips, splinters, dust, grit, or fluff; to chemical fumes; to a glare or deficiency of light; to excessive heat or cold.

By overstraining the organs.

By indirect influence.

Should you be able to aid the Committee in their search for further knowledge on the sanitary state of the trades referred to, they will feel grateful for communications in any form; but, in order to facilitate this object, they have drawn up the following series of questions, which you would confer a favour on them by answering, as fully as may be convenient:—

1. By what occupation have you known the eyes to have been injured?
2. What particular part of such occupations are hurtful; and in what manner does the baneful cause operate?
3. Does the evil apply to one sex, age, or kind of persons more than another?
4. Can you point out any contrivance or arrangement which has been found useful in guarding against injury, or any medical treatment which has proved successful in mitigating its effects, or can you suggest any new means for prevention or relief?
5. Can you point out any contrivance for facilitating or guiding the work of the needle, with a view to diminishing the distress of the eyes?
6. Can you suggest any improvements in artificial light, with respect to cheapness, quality, and convenience, for the use of persons employed in minute work, either singly or many together?

It is desirable that the Society's correspondents, besides giving their names, addresses, and profession or occupation, should mention any circumstance tending to strengthen their testimony. If statements are made otherwise than on personal knowledge, the authority should be given.

I am, Sir, your obedient servant.

P. LE NEVE FOSTER,
Secretary.

EDUCATIONAL APPARATUS EXHIBITION.

The following letter and copies of despatches in reference to this Exhibition, have been received from the Foreign Office:

Foreign Office, April 10th, 1854.

SIR,—With reference to Mr. Addington's letter of the 6th of Febuary last, I am directed by the Earl of Clarendon to transmit to you, for the information of the Council of the Society of Arts, a copy of a despatch from Mr. Crampton, her Majesty's Minister at Washington inclosing a copy of the answer of the United States Secretary of State, to the communication which Mr. Crampton was instructed to make to the United States Government, relative to the Educational Exhibition which it is proposed to hold in London in June next.

I am, Sir, your most obedient, humble servant,

E. HAMMOND.

P. Le Neve Foster, Esq.

Washington, March 7, 1854.

SIR,—I have the honour to transmit to you herewith a copy of a letter from the Society of Arts, respecting an Educational Exhibition, proposed to be held in London, in June next. And in pursuance of an instruction which

I have received from the Earl of Clarendon, her Britannic Majesty's Principal Secretary of State for Foreign Affairs, I beg you to make known the objects of the Society to the government of the United States, and to solicit their co-operation.

I avail, &c.,
(Signed) J. F. CRAMPTON.

The Hon. L. Macey.

Washington, March 12, 1854.

MY LORD,—I have the honour to transmit to your lordship herewith, in copy, a note which I addressed to the Secretary of State of the United States, in pursuance of the instructions contained in your lordship's despatch, No. 30, of the 10th ult., respecting an Educational Exhibition to be held in London in June next, and likewise, in copy, the reply of the Secretary of State to the said communication.

I have, &c.,
(Signed) J. F. CRAMPTON.

Lord Clarendon,
&c., &c.

Department of State,
Washington, March 8, 1854.

SIR,—I have the honour to acknowledge the receipt of your note of yesterday, accompanied by a copy of a letter from the Secretary of the Society of Arts in London to the Earl of Clarendon, relative to an Educational Exhibition proposed to be held in that city in June next.

In reply, I have the honour to acquaint you that the U. S. Government exercises no jurisdiction over the objects referred to in Mr. Foster's letter. I will, however take pleasure in forwarding a copy of your note, and of its accompaniment, to the Governors of those States where primary schools may be supposed to be in the most successful operation, and, in particular, to the Government of New York and Massachusetts, and will commend to their attention the purpose of the London Society of Arts. I avail, &c.,
(Signed) W. L. MACEY.

J. F. Crampton, Esq.

LEGAL POSITION OF INSTITUTES.

A deputation from the Council on the subject of the Bill proposed by them for facilitating the conveyance of sites to, and vesting the same and other property of literary and scientific institutions and mechanics' institutes in their trustees, with power for suing and being sued in the name of one of their officers, had an interview with Earl Granville and the Rt. Hon. E. Cardwell, at the Privy Council office, on Monday last.

Lord Granville and Mr. Cardwell expressed themselves generally in favour of the Bill, suggesting, however, as indispensable, that some kind of registration should be adopted.

The Bill, altered to meet the views expressed at the interview, will be brought into the House of Commons by Mr. J. Hume and Mr. Hutt, immediately after the Easter recess, and when printed will be circulated, in order to obtain the views and suggestions of all parties specially interested.

The deputation consisted of Mr. Joseph Hume, M.P., Mr. Hutt, M.P., Mr. W. G. Lumley, Mr. H. Chester, and Mr. Le Neve Foster (the Secretary).

PUBLIC LIBRARIES AND MUSEUMS BILL.

Mr. Ewart, on Wednesday, the 5th instant, moved the second reading of this bill, which had for its object the repeal of the existing Act, and the providing in lieu thereof greater facilities generally for the establishment of public libraries and museums.

The bill was opposed by the government and others (though expressing themselves favourable generally to the objects of the Act), on the ground that it did not place sufficient control in the hands of the rate-payers, and that too short a time had elapsed since the passing of the present Act to test its efficiency or inefficiency. The bill was thrown out by a majority of three.

PARIS EXHIBITION OF 1855.

A law has just been passed, relative to this Exhibition, granting to parties exhibiting new inventions, protection for one twelvemonth, on somewhat similar terms to those of the Protection of Inventions Act passed in this country with reference to the Exhibition of 1851.

EIGHTEENTH ORDINARY MEETING.

WEDNESDAY, APRIL 12, 1854.

The Eighteenth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 12th instant, Sir ERSKINE PERRY in the chair.

The following candidates were balloted for and duly elected ordinary members:—

Elliott, James	Sier, Rev. Thomas, D.C.L.
Harrison, F.	

Previous to the reading of the Paper, the Secretary called attention to some loaves made by the new French process for making bread, which had been forwarded to the Society by Mr. P. Graham, and portions of which were handed round to the meeting. The process will be found described at page 374 of the present number.

The paper read was

ON INDIAN FIBRES FIT FOR TEXTILE FABRICS, OR FOR ROPE AND PAPER MAKING.

BY J. FORBES ROYLE, M.D., F.R.S.

IN undertaking, on a comparatively short notice, to give an account of Indian fibres fitted for the various purposes to which such products are applicable, I have not hesitated doing so, because I have thought that it was one of the cases, considering all the circumstances of the times, in which we might say of the task, "that it were well done, so it were done quickly." However short the time, I cannot complain of the want of materials, for, as you will readily judge by those which I shall bring forward, they are more than sufficient to occupy the time which I can command from other equally important Indian products; and I know that longer delay will not afford me greater leisure. I hope that the want of due arrangement in my materials will be excused, on account of my desire to bring them forward at as early a period as possible, in order that they may be more generally useful. I must also crave your indulgence for the want of a practical knowledge of the various details which require to be attended to in making use of the various substances which I shall bring to your notice, as applicable to the manufacture of textile fabrics, or for the manufacture of paper, or for the twisting into twine, cord, and rope. But as this is the very point on which the members of the Society are most able to instruct others, they will the more easily excuse a want which they can so readily supply; and it is only by the intercommunication of knowledge of different kinds that results of any considerable importance can in the present day be produced. I have myself frequently experienced, and especially of late, that there is much valuable information known to one class which is totally unknown to another, and that one party complains of the want of materials for particular purposes, while another wonders that so much of what appears to him valuable for those very purposes is

allowed to run to waste, and not thought worth the trouble of collecting even when it has been pointed out.

India is a country of such vast extent, so diversified in soil and climate, that we may readily believe it capable of producing every variety of natural produce, and among these almost every kind of fibre that is known elsewhere. Moreover, if we consider how early India was civilized, how long the greater number of the useful arts have there been practised, we might have inferred that the country must have possessed a variety of substances fitted for the different purposes to which flax and hemp are applied in other countries,—that is, for the coarse as well as the finer textile fabrics, such as the construction of mats and of canvas, of sails and of ropes for their shipping, and of tow lines, of lines and of nets for their fishing. Cotton, we shall find, was and is still applied in India for many of the purposes to which only hemp and flax or leather are thought applicable in other countries, such as the coverings of carriages and of tents, the sails and the rigging of ships. Further, as we shall on inquiry find, that the natives of India, besides writing on leaves, and engraving their records on metals and on rocks, have long been acquainted with the manufacture of paper, we may enquire whether cotton is the only substance they convert into this substance, or whether there are not other substances which they themselves apply, or which we may not apply to the growing (I had almost said insatiable) demands of this manufacture, as necessary for our comfort and commerce, as for the continued and advancing civilization of the world.

If we extend our enquiries among the plants cultivated in India, we shall no doubt be surprised to find among them both the true hemp and flax, and to learn that both are extensively cultivated, not in one, but in almost every part of the wide spread territories of the Indian empire: and also that in few places are they valued for their fibres, the hemp being esteemed for the intoxicating properties secreted by its leaves, and the flax or linseed plant for the oil stored up in its seeds; the stems of both being thrown away or burnt. We shall at once be apt to conclude that countless loads of valuable fibres are thus yearly destroyed, in consequence of the ignorance, carelessness or prejudices of the cultivators. But in this, as in many other subjects, we shall find that a little knowledge is a dangerous thing, for, the hemp being valued for its intoxicating secretions, it is found that these are best produced when the plants are freely exposed to light and air, so the natives place the plants 9 and 10 feet apart. This exposure to light, heat, and air in a good soil is so well suited to the plant that it grows to a large size and branches in every direction, but the fibres, instead of being strong and flexible, are found to be brittle, harsh, and woody, in fact fibres are only wood in a separated state, while wood is composed chiefly of amalgamated fibres. Exposure favours the formation of woody fibres, but, as we know in the case of timber-trees, this diminishes its flexibility, and therefore when the hemp and flax are cultivated for their fibres they are in European countries, sown thick, and grown closer and closer according as the fibre is required to be of finer quality. The flax in India being valued for its seed, is, on the contrary, sown in lines, as an edging to other crops, so that exposure is equally secured, a good crop of oily seed is produced, but the fibre is short and brittle, and unsuited for the general purposes of flax. I do not say that the Indian climate is the best suited to the production of the fibres of these two plants, but that the mode of cultivation is better suited to the secretions of the resin in one case, and of oil in the other, than for the production of good flexible fibre in either plant. On the other hand, it is now well known that India possesses various fibres from several fast-growing plants, but of these fibres some are deficient in strength, others are remarkable for being coarse and harsh in texture, and not remarkable for strength, and therefore it has been inferred by some intelligent men that the heat and moisture of the climates in which they grow, are quite unsuited to the production of good fibres. But here the conclusion come to, is equally hasty, for no distinction is made between what is due to the nature of the plant itself, and what to its mode or place of growth; we should not in this country expect that any mode of growth would give a poplar the strength of an oak, and there is as little reason for expecting that the soft and silky *jute* of India should have the tenacity of Russian hemp. But I hope to be able to show that India grows plants in some of its dry and barren plains, which are as strong as any produced in other parts of the world, and indeed equalled only in such properties by others growing in some of its moistest and warmest valleys, and all in sufficient quantities to be of commercial value.

Though India, as I have said, possesses a vast number of fibre-yielding plants, and which are either totally or nearly unknown even to those making enquiries on the subject, it is not my intention on the present occasion to dwell on any of those little known products, partly because we have little more information to communicate respecting them than the fact of their existence, but chiefly because, in sacrificing novelty, I shall have more time to attend to what is most useful.

Though few out of the many Indian fibres are objects of commerce, the remainder, or at least a majority of those I am about to notice, are not novelties, because most of them were brought to the notice of the Indian public, as well as of the Society of Arts, by Dr. Roxburgh, at the beginning nearly of this century; and his exertions were rewarded by the Gold Medal of the Society. Dr. Roxburgh's attention had been turned to the subject because, being Superintendent of the Botanic Garden at Calcutta, he had charge of one of the farms which had been established for the growth of hemp, and substituted for it, in consequence of the Lords of the Privy Council for Trade and Foreign Plantations, in a letter dated the 4th of February, 1803, having recommended to the Court of Directors of the Hon. East India Company to encourage as much as possible the growth of strong hemp, &c., in India. But the attention of the Court seems to have been directed to the subject at still earlier periods, as the date of 1792, is given to several consultations in some of the publications on the table; and in one of them ("On the Sunn Hemp of Bengal") we learn that great losses were sustained in the years 1796, 1797, and 1798, and all such imports were discontinued till 1800, when differences occurred with the northern powers of Europe. Though Dr. Roxburgh wrote no separate work on the subject, he made many experiments, wrote letters and reports, and sent home numerous specimens; while considerable quantities of linen and of jute were imported by the East India Company. These were at times discontinued and again resumed; but now we may almost consider them as trophies of the last war, for in the year 1850-51 there were exported from Calcutta of Sunn hemp, 7635 maunds;* of jute 793,299 maunds; 8,759,185 gunny bags; 276,528 gunny cloth; besides canvas-twine and log-line; with 518,683 gunny, and 3371 cwt. of hemp and rope from Bombay.

Many other fibres which were tried at the same time still remain unknown, though possessed of very valuable properties. This must be partly ascribed to the constantly changing nature of Indian society, so that what is familiar to all at one period becomes totally unknown only a few years afterwards. This the more so, as few pay attention to such subjects, and the natural sciences unfortunately forming no part of general education, even the brief records which are there made escape notice; so that I was induced, on a former occasion, to observe that "the generality of modern experimentalists seemed to be unacquainted with the labours of their predecessors, many of them commencing improvement by repeating experiments which had already been made, and announcing results as new which had long previously been ascertained." The short essays, moreover, which have been written on such subjects soon disappear from circulation; and, though great books have been pronounced to be

* A maund is equal to about 82 lbs. English.

great evils, small ones form as evanescent records as writings on the sand, which the waves of time soon pass over and obliterate.

But an equally great difficulty in making new things known and appreciated as articles of commerce, arises from the habitual neglect of such things when sent to market. For if sent as specimens, in order to have their value ascertained, they are generally pronounced of "no value," because they are "unknown in the market." While, if a planter or a colonist sends a sufficient quantity ever for manufacturing purposes, it is consigned to his agents, and by them transferred to a broker, and by him sold with other colonial products, when few, if any, are acquainted with its properties, or the quantities in which. if approved of, it might be supplied. So that it is usually sold at a price which does not pay its expenses, and, therefore, no further quantities are sent, and further progress rendered impossible.

[The greater portion of the remaining part of this paper was reported.—Sec. S. of A.]

After these general observations, I shall point to the different plants we have in India for producing fibres, and I shall observe something of a scientific arrangement, although without interfering with the practical purpose of my remarks. The speaker proceeded to call attention to the various specimens which covered the table and the walls of the room. He first referred to the silky fibre of the cotton tree, which could be made into paper, and a coverlet made in India from it was produced. He then pointed to some bast from Arracan, various kinds of which had been tried at Chiswick with success. Grasses and sedges were also much used in India for making ropes, and these had the advantage of not being easily rotted. Specimens of the ropes of Bhabhur were handed round.

Attention was now called to a group of plants which might be called lilyaceous, remarkable for showy flowers and long leaves, the simple pressure of which was sufficient to bring out the fibres. They flourished both in warm dry plains, and in moist valleys. The fibres were capable of being converted into fabrics of great beauty and utility, as well as into paper. The Moorghae or Marool was to be found all over India, and was common along the Coromandel, Malabar, and Bengal coasts. The fibre of this plant was remarkable for its whiteness. It was used in the making of ropes in Calcutta; these had been tested by the master attendant there, and they broke at 137 lbs., when Manilla hemp broke at 188 lbs., which showed they were inferior to ropes made from other fibres which he would describe. The plant, however, was useful for many puposes, and could be produced cheaply and in great abundance.

Reference was next made to the aloe plant, the name of which, the speaker said, was familiar to all. It grew plentifully upon the coast of Africa, although it was doubtful whether the medicinal aloe yielded much fibre; but some good roping, made from the true aloe, was exhibited. The plant commonly called the aloe in England was that which took a number of years to come to maturity, but the statement that 100 years were necessary for this purpose was fabulous; at least a very few years sufficed in its native country. There were two of these plants which produced fibres—the *agave Americana* and the *agave vivipara*. The first was sometimes distinguished as the Pita, or Great Aloe, as it grows to a large size, the leaves being ten and twelve feet in length. It was used for many purposes, and, as a proof of its great strength, Humboldt describes a bridge where the distance of 131 feet was spanned by ropes made from the agave Americana, which actually formed the ground-work of the roadways. This agave was found in a great many parts of the Indian continent, in the Deccan, in the North-west, and in many parts of the Madras Presidency. One peculiarity of this agave was, that it required no care in cultivating it, even in dry situations, and was useful in making hedges and fences. The fibre, which was produced, was a white, elegant-looking product. In the course of some experiments made by Dr. Wight, it was ascertained that ropes made from this fibre broke at a pressure of 362 lbs.; while the rope of the Sunn fibre of India broke at 404 lbs. Some of the fibres received most beautiful colours when they were dyed; and the lecturer produced strong, unbleached specimens of paper made from a combination of this fibre with the fibres of some of the other plants.

The learned gentleman next referred to the Pine Apple Plant, or *Ananassa sativa*, so well known and prized, he remarked, in this country for the richness of its fruit. In other countries, however, it was valued also for the sake of the fibre yielded by its leaves. Many of those present must have seen and remembered the beautiful fabrics in the Great Exhibition of 1851, worked upon pine-apple cloth from the Phillipine Islands. Some fine specimens from Manilla and India were handed round, and excited much admiration, especially among the fair portion of the audience. The pine-apple was a native of America, but it had been introduced into the Old World, and was now to be found in jungles in the East. Travellers mention the quantity of pine-apples passed through in Burmah, Rangoon, &c. The natives do not twist the fibres into thread, as is the ordinary way, but gum the ends together, and not by invisible knots, as an old author had stated, but in a way that could be discovered, if inspected, and thus a long thread was made. Pine-apple fibre was better suited for making fine work, like muslin, than for ropes; but it was sometimes converted to such purposes, although destitute of the strength that others possessed.

The attention of the Society was next drawn to a plant well known on account of the fruit which it bore, the Banana, or Plantain. There were different species of this product, but they were all probably the fruit of the same species. It was uncertain whether it was, in its origin, common to the New and Old World. It abounded in useful properties, which, unfortunately, were continually allowed to run to waste. It contained a large portion of farinaceous matter, and furnished the prime necessary of life to the thousands and millions of people in the tropical regions, and was valued only for this attribute. It had, however, other claims upon our attention, for it abounded in fibres, which might be turned to most useful account. In extending its cultivation we should be at the same time increasing the supply of the food of the world to an indefinite extent—to an extent that could not be consumed on the spot. This, however, need not create alarm; for, as it contained a large quantity of saccharine matter, it might be eaten after the lapse of many years. In the Exhibition of 1851 some of the fruit was exhibited that had been in this country thirty years, and they were still in an eatable state, and had much the taste and attraction of dried figs. The farinaceous portion abounded in all the nutritious properties of meal, as was proved by an analysis prepared by Professor Johnston; and Humboldt stated, many years since, that the banana was to the torrid zone what rice was to Bengal and China; and that the ground then producing the plant might support double the amount of population. These were thought exaggerations at the time, but Humboldt's statement had been since sustained. The lecturer went into various calculations to show the food-productiveness of the plant. This enormous result, he said, was owing to the fact that each plant threw up from ten to twelve suckers, each becoming large stems. The stem was every year cut down, or there would be no more fruit procurable from the plant. By cutting down the stem a succession of fruit might be produced nearly all the year round. So much for its utility as a supplier of food. Each plant yielded from three to four pounds of fibre, which could be made into all sorts of fabrics, coarse and fine, the former being useful and strong, and the latter extremely elegant in appearance. It was fit for ropes, and it made good paper. Here was a plant which was cultivated solely for

the sake of its fruit. Mr. Sharp, whom he was happy to see present, had investigated the subject, and calculated that each plant would yield 3lbs. of fibre, or 9,000lbs. per acre; others, however, calculated upon 4lbs. per plant, which would give us so much more per acre. In the region where it was reared, there was a great inducement, on account of its nutritious properties, to rear it. The meanest man in the tropics, if he had no other possession, had his plantain in front of his hovel or cottage. The stem itself, he should mention, was totally useless for any purpose: it was not even useful for manure or burning. So easy was it to obtain the fibre that it was only necessary to pass it between rollers. He repeated there was a vast quantity of useful material in this plant. The ropes he held in his hand were of an excellent quality, and he must say there was nothing extraordinary in this; for, like the Manilla hemp, it belonged to the genus *musa*. The lecturer showed different qualities of paper made from the fibre—some by the prisoners confined in the gaols of Madras—some drawing paper, and others for packing. He pulled these specimens from hand to hand, and said they were remarkable for great tenacity. The colour might be objected to, but it should be remembered that none of the specimens had been subjected to the ordinary bleaching process. Some paper made from the fibre in France was then shown, which was white, of close texture, and like parchment for tenacity and durability. Some very fine handkerchiefs made from the fibre of the plaintain were also exhibited.

The lecturer then said he would pass from these to a totally different set of plants—those which were exogenous in their growth. Among these was the flax plant. Flax required a peculiar climate, and there were portions of India where it could not be produced, though linseed was abundant. The Saugur territory possessed the necessary climate. Wheat brought from that country some time ago was of such excellent quality, that it was valued at the highest price in the market—100s. per quarter. In other parts of the country experiments had been often made for producing flax, but they had failed. In the central parts of India, as Jubhulpore, and in the Punjaub, flax h d been obtained.

Closely allied to the flax plants were several known plants. There was the jute of India, or the *corchurus*, which grew in Bengal and in the Conkan, and produced very long fibres, which were shown to the meeting.

Allied to those plants were the Mallow tribe and the cotton plant. Ropes for shipping and other purposes were frequently made from the fibre of the latter. The specimens of sail cloth produced looked good, but the lecturer stated that the objection was, that when they got wet it was difficult to get them dried. Among the Mallow tribe was the brown hemp of India, which, in strength, approached the hemp in ordinary use amongus. There was a great variety of the same family, which had been experimented upon by Dr. Roxburgh, and found applicable to the manufacture of fine materials, and to paper. The Sunn Plant was well known as coming from India, and considerable quantities were imported, although less now than in former times. Dr. Wight found that it broke at a pressure of 400 lbs. It attracted much notice a considerable number of years ago, and several works were published to explain its properties. In the same group was the Danche, very much in request in Bengal for its fibre, as ropes were made of it, which stood wet well, but it was objected to on account of its harshness. The fibres from the above plants were not so strong as the real hemp, but they served many useful purposes.

The fibre he had now to call the attention of his hearers to possessed greater strength than any of those to which he had alluded. Having occasion to inquire into the strength of different products, he had had some experiments made. Taking different fibres of the same weight and length, he had had the ends tied together, and then sent them to the military store office of the East India Company. The weight that each fibre broke with was ascertained as follows:—

Fibres in equal weights and of equal lengths tested at the E.I.C.'s Military Stores.

	lbs.
Petersburgh, broke with	160
Jubhulpore hemp, from Mr. Williams	190
Wuckoo nar fibre, Travancore	175
Mudaror Yereum fibre, common all over India	190
China grass, Boehmeria nivea	250
Rheea fibre, the same from Assam	320
Wild Rheea, Boehmeriæ species from Assam	343
Koto Kangra hemp (no breakage at)	400

East India House, Decr. 16th, 1853.

He would now particularly address himself to those fibres which exhibited the greatest strength. He was not well acquainted with the wuckoo-nar, but he produced some excellent canvas made by it, and showed that it was stronger than some made with the Polish. It was cultivated in such districts that it could be easily obtainable for commercial purposes—a consideration which should not be overlooked. There was another plant which had been subjected to experiments by Dr. Wight, but had not been mentioned by Dr. Roxburgh. It was to be found in all dry parts of India, as common as a weed, and treated as if it were of no value. But it was found that it possessed many useful properties. It had long ago been used for medicinal purposes, but only recently were its juice and its fibrous qualities discovered. When the Sunn broke with 444 lbs., this fibre did not break under 552 lbs. Thus they had a fibre of great strength, common everywhere in arid, and to be found in the neighbourhood of cultivated, places. The lecturer produced the fibres and a rope made from them.

He next referred to the hemp or *cannabis sativa* of botanists, which was cultivated in every part of India, on account of the intoxicating property of its leaves, and an exudation which flows from them. The natives of the hills turned it to other uses, for they made ropes of it, and a traveller in the Himalayas related that their ropes were applied to various purposes, ropes-ending their wives and hanging superfluous children. The cultivation of hemp was well understood by the natives of the mountains, and the best hemp could easily be procured if we desired to cultivate a trade in that product, as it sold at a ridiculously small price.—5s. per cwt. Lord Auckland paid some attention to this subject, when Governor-general of India, and found that the prime cost of this hemp would not exceed £7 16s.; however, the officers thought it better to be safe, and, making allowance for every charge, calculated the price at Calcutta to be £17 14s. per ton, and £13 4s. per ton from other places. This hemp was admirably adapted for making canvas, and was cultivated throughout the Himalayas. The hemp from Kote Kangra did not break at 400 lbs. A sample of this fibre, in its primitive state, just as it came from the plant, was here handed round, and several gentlemen essayed in vain to break it.

From "the true hemp" he would pass to the family of nettles, which was closely allied to the hemp plant, and considerably resembled it, especially in tenacity. The beautiful fibre (specimens of which lay on the table) had been imported at different times to this country from China, and sold sometimes at as high a price as £120 per ton. It was greatly admired. The lecturer pointed out this fibre in its different stages—its rough state before it was heckled, and after it was heckled, &c. He produced a plant which he had grown himself last year. Dr. Roxburgh pronounced the calove to be the strongest fibre he had ever seen. When the tea culture was established in Assam, an educated Chinese recognised in one of the plants of that country the Chû Mâ of China; and since then botanists had been unable to discover any difference between them. Several attempts had been made to produce these for commercial purposes, but they had failed

in consequence of the low prices obtained, and speculators who had embarked in the ventures had not been induced to repeat them. This plant was remarkable for the rapidity of its growth, producing as it did three, four, and five crops in the year. As soon as it was cut down, like nettles it commenced to spring up again. Major Hannay, who was induced to cultivate it for the purpose of seeing whether it could not be established as a permanent article of commerce, obtained from the crop 12 maunds per acre. He had adopted the Chinese method, and prepared the fibre, which was in various stages of progress, on the table. For all practical purposes it was indentical with Chinese grass. There was no difficulty in growing the plant; but there was a difficulty in separating it from the fibre, but he had no doubt that mechanical ingenuity in this country would overcome this obstacle, and devise some better means of separating it than the natives adopted, namely, tearing it with their nails. An authority of great weight, Mr. Marshall, of Leeds, had pronounced that for all practical purposes this plant, grown in our own province of Assam, was the same as the Chinese grass, not so fine, but for all practical purposes as good. The Court of Directors had ordered twenty tons of the rheea fibres, as well as of the above Himalayan hemps, to be sent here yearly for two or three years, for the purpose of having them tried. This step would cause their value to be appreciated and established.

The lecturer then proceeded to refer to another plant sent by Major Hannay, the Wild Rheea, some of which, through the kindness of W. Cotton, Esq., had been made up into a 5-inch rope, for the purpose of trying its strength. It was pronounced to be as good as anything that had ever been produced, and no doubt when the fibre was better known it would be valued. The rheea fibre had also been made into a rope, and the ropes of these two rheeas were pronounced to be as strong as any that are ever made.

He had also had a small portion of it made into cord, which was three times strongehan similar co r d made with Russian or Italian hemp.

Experiments on Strength of Rope made from samples of Fibre of the growth of India, received from Dr. Royle, at Messrs. Huddarts' Rope Manufactory, Limehouse, Feb. 13, 1854:

Description of Hemp.	Size of Rope.	Number of Yarns per strand.	Total number of Yarns in Rope.	Strength of Rope in pounds.	Strength of Rope per inch, circumf. squared.	Size of Rope at breaking.	Tar absorbed.	Amount of stretching.
	Inc.							
Wild Rheea, 1st expt.	4¾	44	132	19032	*844	4⅝	1-7th	1 in 16
Ditto, 2nd experiment	4¾	44	132	21025	*894	4⅝	1-7th	1 in 16
Rheea Fibre	4¾	44	132	30488	*910	4⅝	1-9th	1 in 16

Both in the state of simple fibre, and in that of rope, it had all the strength that was required. The learned gentleman, after stating that the list of plants might easily have been extended, concluded as follows:—

The foregoing enumeration will, I hope, be considered sufficiently extended to prove that India possesses a number of plants, many of them valuable as articles of food or for other properties, and which contain very valuable qualities of fibre, useful either for paper-making, for textile fabrics, or for cordage. They vary in firmness and in strength, as is required for the various wants of the arts and manufactures of civilised life. It would be easy to extend the list with the names of many other plants which are already employed by the natives of India, or which have been subjected to experiment by Europeans, but it will, perhaps, be better to recapitulate the most important of the subjects which I have brought before your notice. Neglecting the grasses, which, however, are not to be forgotten if we want a cheap material for paper-making—and this was far from an unimportant object, considering the constantly increasing demands and the rising prices of the raw materials required for this indispensable requisite of civilised life. That paper so made will not be devoid of many useful properties I feel well assured, from the pleasure I myself experienced in writing these notes on paper made from straw. But it is in the white-fibred plants, such as the bowstring hemp, the aloe, and the Pita fibre, also in the pine-apple, and, above all, in the plantain, we have boundless resources of material not only for paper-making, but for the finest as well as the coarsest textile fabrics, and for cordage which may rival Manilla hemp, or the American aloe which bridges over broad rivers. The oakum of these plants may be converted into paper, and the fibres into fabrics of different qualities; and though they may not be fitted for making knots, they will yet make ropes which are capable of bearing considerable strains, and possess the advantage in their white colour of not being likely to deceive the purchaser by a semblance to hemp. Among the malvaceous and leguminous plants, or those among which the brown hemp and sunn of India are found, with the jute among the Linden tribe, we have a variety of cheap products, because the plants can be grown with ease, and their fibres separated with facility. Though these do not possess the strength, they have the colour of hemp, which I am told is an advantage; and they are admirably adapted for many coarser fabrics, as well as for cordage for ordinary purposes. Many of them also are edible, like the okhro of the West Indies and the *ram turai* of India, and, therefore, we may, as in the case of the plantain, be multiplying the supply of food for the body, at the same time that we are increasing the means for diffusing information for the mind.

But, if we require fibres possessed of all the strength of Russian or of Polish hemp, we shall find this property not only in the hemp of the Himalaya but in the various nettles which clothe the foot of these mountains, from Assam to the Sutlej, and if we pay a price proportioned to the quality of the article, I have no fears but that the supply will increase in proportion to the demand. If we want them still cheaper than they can at present be furnished, we have only to supply the cultivators with some simple machinery, by which the fibre may be separated more easily than by the present primitive methods. Then I feel assured that the Rhea fibre will not only undersell every other fibre, but, in point of strength, take a position which will be second to none of the fibres which are at present imported, and India is in many respects well suited to the growth of fibres.

In addition to affording such facilities, I hope the day is not distant when something will be done to encourage instead of depressing the efforts of planters and colonists when they send a new thing to market; because some account of the properties and value of the article as suited to different purposes would be more encouraging than a statement that it is of "no value" because "unknown in the market," while the fact very often is that the substance is well known in many markets, though not in the one to which it has unfortunately been sent. I feel confident that the Collections of Raw Products which are being established will have considerable effect, but they should be multiplied so as to extend to every large commercial town, or at least to the principal sea-ports, and as in the City, time is counted by minutes, I would have one in the very heart of the city. But to be fully useful such collections should be connected with societies interested in the investigation of such subjects, and publishing ournals where the learning, the science, and the practical applications connected with such subjects be published. I could almost hope that the time is come (or very nearly so) in which knowledge of natural subjects should be considered a part of general education, and that what is called the study of geography be connected with a general knowledge of the soils, the climates, the plants, and the animals of the different regions of the globe, and not be confined to the height of mountains, the length of rivers, and a bare enumeration of places. Some of the improved

* The average strength of Rope made with the best hemps, and after numerous experiments from 1803 to 1808, is 805.

views now entertained on such subjects must be ascribed to the discovery that so many made of their own profound ignorance at the Great Exhibition of 1851, which in this, as in so many points, will continue to be, as it has already been, of immense benefit both to producers and consumers in all parts of the world.

List of Indian Plants.

Common Name.	Botanical Name.	Uses.
Papyrus of the ancients	Cyperus tegetum	Used in India.
Bhabur	Eriophorum cannabinum	*Twine* and *rope* used for crossing Himalayan rivers.
Moonj and Sara	Saccharum munji; ——— Sara	Ropes for farmyards, for Persian wheels, for tow ropes — a cheap material for paper.
Moorghae or Marorh	Sanseviera zeylanica	*Bow-string hemp* of Arears, abundant along coasts. Fibre made into cordage, used as Bast. Fibres dyed, made into cordage, woven into cloth. Experiments on strength of fibre by Mr. Bond, by Dr. Wight. Oakum.
Aloe fibre	Aloe perfoliata	Kala bunlha. Fibre from Madras. Oakum. Dyed orange, red, and crimson.
Pita in Adam's Needle	Yucca gloriosa	Fibre and Oakum
Pita fibre in great Aloe	Agave Americana and vivipara	American plant introduced into and common in every part of India.
Pine-apple fibre, or Silk grass of some	Ananassa sativa	Fibres and Oakum of various kinds, and worked handkerchief cords of different sizes.
Manilla hemp	Musa textilis	Fibre. Rope and Handkerchief.
Plantain fibre	Musa paradisiaca	Preserved fruit and meal. Fibre, tow, cords, rope, tarred rope, canvass, worked handkerchief, paper.
Cocoa	Cocos nucifera	Cocoa, cord, and ropes.
Ejoo	Arenger saccharefere	Ejoo fibre and rope. Brushes.
Palmyra fibre	Bonassus flabelliformis	
Flax	Linum usitatissimum	
Bast	Tilia Europæa	Indian basts from Arracan.
Jute	Corchorus olitorius	Jute. Cloth, gunny bags and rope.
Dhoh	——— capsularis	
Brown hemp	Butea frondosa; Hibiscus cannabinus; ——— striatus	
Cotton	Gossypium indicum; Abroma Angusta	Canvas and rope.
Sunn	Crotolaria juncea	
Jubbulpoor hemp	——— tenuifolia	Fibre.
Dhanchi	Esbania cannabina	Fibre and rope prepared.
Maljhun	Bacchinia racemosa	Fibre and rope.
Ak and Mudar	Calatropis gigantea	
Yercum	——— Hamiltonii	
Ibukka nar		
Hemp	Cannabis sativa	Fibre and canvas.
China grass or Rheea	Boehmeria nivea	
Wild Rheea	Boehmaria speciosa	
Peer fibre	Boehmaria frustescens	
Neelgherry Nettle	Urtica heterophylla	

DISCUSSION.

Dr. Buist felt that the paper which had been read to them by Dr. Royle was most valuable, but the information they most particularly wanted was, as to the means of extending the cultivation of the various plants from which the fibre was to be obtained, and the method of getting them brought to market. He considered that these substances might be productive of the most valuable results, if they could once determine the difficulties to which he alluded. In 1847 a plan was projected for the establishment of a museum in Bombay, in which the whole of the products of Asia should be collected, and arranged geographically, and again according to the class to which they belonged, such as gums, fibres, &c. Valuable as such an institution would have been it was not carried out, and he had since had the honour of addressing the government on the subject, with a view of founding a school of industry, in which these various products might be prepared for the home market. He had had the honour of being one of the committee to prepare a collection of the products of India for the Great Exhibition of 1851, and, wonderful as that collection was admitted to have been, he believed that it was much inferior to that which might have been made, had a museum such as he alluded to been in existence. Many attempts had been made to obtain such a museum, and he had no doubt that it would yet be found that the fibres of India were the most valuable that could be brought into the English market.

Mr. Symonds fully concurred with Dr. Royle in the necessity for a Trade Museum, more especially in the City, where such an institution was much required. The want of materials for textile and paper manufactures was at the present moment much felt, whilst his colonial experience told him there were a variety of the most valuable products which were not as yet brought fairly into the market. The paper of Dr. Royle had necessarily been confined to the products of India, but he knew that in Canada, Australia, and Brazil a large number of fibrous plants were to be found peculiarly applicable to manufacturing purposes. Having referred to a letter from a colonial merchant on the subject, Mr. Symonds proceeded to say, that the great and increasing demand for paper was becoming a most serious consideration with the manufacturers. The literature of the antipodes was extending to such a degree that one paper in Victoria circulated 12,000 daily, whilst the circulation of very few of the English daily papers exceeeded 3,000 or 4,000, although there was in this country a great demand for paper for the periodical literature. A short time since a prospectus was issued for the establishment of a company to make paper from the plants in the West India Islands. He had lately lost sight of this company, but he hoped that it was not abandoned, knowing as he did that a large supply of the raw material might be obtained from Dominica, the Bahamas, &c., &c., while the demand for the manufactured article was still on the increase. During the late war the Society of Arts had been the means of calling attention to the value of Russian hemp, and now that war was about to stop that supply, the Society and Dr. Royle had rendered good service by showing that we had within our own colonies substitutes equally, if not more, valuable than that article itself.

The Chairman said there was one question connected with this subject, which was perhaps more important than any other, namely, the practical method of bringing these various substances into use. He understood that there was a gentleman present, Mr. Sharp, who had devoted much attention to the subject, and he should much like to hear any observations that gentleman might wish to make.

Mr. Sharp thought one of the most important subjects to consider, was the amount of fibrous materials used in this country, and how much of it would be placed in jeopardy by the present state of events. The quantity of fibrous substances so used was 614,000 tons, of which 94,000, and 63,000 tons of hemp and flax respectively, came from a

country to which he need not more particularly allude, Dr. Royle had shown that flax might be very efficiently replaced by the plantain, from which the finest fibre could be obtained, and the only question was, whether that fibre was capable of being used for textile manufactures. He had had some experiments made under a new process of heckling, and he had no hesitation in saying it might be so used. Another and not a less important purpose to which it might be applied, as shown by Dr. Royle, was the manufacture of paper, the trade in which exhibited a most extraordinary state of things. He found by reference to the report of the Commissioners of Excise Inquiry (generally called Sir H. Parnell's Committee), that the amount manufactured in the five years from 1830 to 1834, both inclusive, was 254,960,658 lbs., or an average of 70,988,33 lbs., and he also found that in the five years from 1849 to 1853 the manufacture increased to 765,170,893 lbs., being an average of 151,234,171 lbs. per annum. Last year the amount manufactured, in round numbers, was 177,000,000 lbs., against 154,000,000 lbs. in the previous year, showing an increase of nearly 20,000,000 lbs. in one year. Mr. Sharp then proceeded to state that they had been told by Dr. Royle that the plantain was indigenous to all tropical climates, and might be cultivated to any extent. This he believed to be true, and that it might be so treated as to render them altogether independent of Russia, while the supply would always be certain, and really benefit the East and West Indian colonies. He then exhibited a specimen of pulp, made of the plantain fibre, showing that it was perfectly applicable to the manufacture of paper.

Mr. Dilke here suggested that it would be very beneficial if Dr. Royle would allow his valuable specimens of Indian fibres to remain on view at the house of the Society for a few days.

The Chairman intimated that Dr. Royle had already consented to do so.

Lord Berriedale observed that very few persons were aware of the beautiful substances to be obtained from India, and the great advantages they offered as substitutes for flax; and therefore suggested that every possible publicity should be given to the results of Dr. Royle's inquiries.

The Chairman thought the subject one of the deepest importance, and, as there could be no doubt that by competition they had destroyed the native manufactures of India, they ought to do everything in their power to foster the prosperity of that country by the use of her products. Unfortunately, they had too short a time at their disposal for the discussion to enable them to give to the subject the consideration which it deserved, and therefore they could not go into the question how those resources of India might be brought into practical account. But he was sure that they would not wish to part without giving their warm thanks to Dr. Doyle for the information he had laid before the Society, and which showed that the East India Company, in availing themselves of his services as a physician, could not have done better, as he had stepped out of his way to add to the researches of science, and to benefit the country with which he was connected.

Mr. McLauchlam stated, from his knowledge of the country, he was quite sure that fibrous plants to any extent might be obtained in the several districts of India, but that the great want of the country was farmers of capital, or a certain market for their produce.

Dr. Royle said, that he had forgotten previously to state that there were some beautiful specimens of Indian fibres on the table, prepared by machinery, the invention of Mr. Dickson, which completely altered their character, and fitted them for the manufacture of the most delicate fabrics.

Mr. Fothergill considered that the great hindrance to these fibres being brought into the market was, the want of one class of machinery capable of working all kinds of material. Thus the machinery with which they could work flax would not work wool, and for the latter article there were two kinds of machines—the one for woollen fabrics, and the other for worsted. For flax they required three kinds of machines—for the long, for the short, and for the refuse, or tow, whilst for cotton they required two kinds, one adapted to Egyptian, or long, the other to the Surat, or short cotton. If they could get over that difficulty, and obtain machinery applicable to the preparation of all fibres, he believed that a large number of the valuable products brought under their notice by Dr. Royle, might come into general and advantageous commercial use. By way of illustrating the delicacy of manipulation necessary to be observed in the preparation of fibres, he stated that, although a fibre might be quite incapable of being worked through a machine in one direction, yet, by simply reversing it, this might be done; and he believed that by means of electricity many of the nicer manipulations might, by a little ingenuity be accomplished, so as to overcome all the difficulties to which he had alluded.

The Secretary announced that on Wednesday next, the 19th instant, the following Papers would be read:—1. "On Water Meters," by Mr. Joseph Glynn, F.R.S.; and 2. "Description of Taylor's Water Meter," by Mr. B. Fothergill.

Statement of the Annual Averages of Prices of Wheat, Barley, and Oats, in England and Wales, from 1771 to 1851.*

Years	Annual Average Prices per Imperial Measure. Wheat. s.	d.	Barley. s.	d.	Oats. s.	d.	Years.	Annual Average Prices per Imperial Measure. Wheat. s.	d.	Barley. s.	d.	Oats. s.	d.
1771	48	7	26	5	17	2	1811	95	3	42	3	27	7
1772	52	3	26	1	16	8	1812	126	6	66	9	44	6
1773	52	7	29	2	17	8	1813	109	9	58	6	38	6
1774	54	3	29	4	18	4	1814	74	4	37	4	25	8
1775	49	10	26	9	17	0	1815	65	7	30	3	23	7
1776	39	4	20	9	15	5	1816	78	6	33	11	27	2
1777	46	11	21	1	16	1	1817	96	11	49	4	32	5
1778	43	3	23	4	15	7	1818	86	3	53	10	32	5
1779	34	8	20	.1	14	5	1819	74	6	45	9	28	2
1780	36	9	17	6	13	2	1820	67	10	33	10	24	2
1781	46	0	17	8	14	1	1821	56	1	26	0	19	6
1782	49	3	23	2	15	7	1822	44	7	21	10	18	1
1783	54	3	31	3	20	5	1823	53	4	31	6	22	11
1784	50	4	28	8	18	10	1824	63	11	36	4	24	10
1785	43	1	24	9	17	8	1825	68	6	40	0	25	8
1786	40	0	25	1	18	6	1826	58	8	34	4	26	8
1787	42	5	23	4	17	2	1827	58	6	37	7	28	2
1788	46	4	22	8	16	1	1828	60	5	32	10	22	6
1789	52	9	23	6	16	6	1829	66	3	32	6	22	9
1790	54	9	26	3	19	5	1830	64	3	32	7	24	5
1791	48	7	26	10	18	1	1831	66	4	38	0	25	4
1792	43	0	—	—	16	9	1832	58	8	33	1	20	5
1793	49	3	31	1	20	6	1833	52	11	27	6	16	5
1794	52	3	31	9	21	3	1834	46	2	29	0	20	11
1795	75	2	37	5	24	5	1835	39	4	29	11	22	0
1796	78	7	35	4	21	10	1436	48	6	32	10	23	1
1797	53	9	27	2	16	3	1837	55	10	30	4	23	1
1798	51	10	29	0	19	5	1838	64	7	31	5	22	5
1799	69	0	36	2	27	6	1839	70	8	39	6	25	11
1800	113	10	59	10	39	4	1840	66	4	36	5	25	8
1801	119	6	68	6	37	0	1841	64	4	32	10	22	5
1802	69	10	33	4	20	4	1842	57	3	27	6	19	3
1803	58	10	25	4	21	6	1843	50	1	29	6	18	4
1804	62	3	31	0	24	3	1844	51	3	33	8	20	7
1805	89	9	44	6	28	4	1845	50	10	31	8	22	6
1806	79	1	38	8	27	7	1846	54	8	32	8	23	8
1807	75	4	39	4	28	4	1847	69	9	44	2	28	8
1808	81	4	—	—	33	4	1848	50	6	31	6	20	6
1809	97	4	47	0	31	5	1849	44	3	27	9	17	6
1810	136	5	48	1	28	7	1850	40	3	23	6	16	5
							1851	38	6	24	9	18	7

* Excerpt Popular Tables arranged in a new Form, for ascertaining the Value of Lifehold, Leasehold, and Church Property, &c. &c. By Charles M. Willich. Longmans, 1852.

Home Correspondence.

INSTITUTION BUILDINGS.

Mechanics' Institute, Royston, Herts.
April 10, 1864.

SIR,—In my letter which you kindly inserted in the last number of your Journal, I neglected to give due expression to our want of good designs for Institution Buildings. We, for instance, are with very great difficulty raising funds for a building which must be plain, because we shall have no money for ornament; yet are we anxious that the building be a credit to our town, and it will be so if with the plainness we combine elegance of form. We hope we may be fortunate in meeting with the counsel and assistance which we seek in this direction through your valuable columns.

This is no unimportant matter. The *influence* of a literary or mechanics' institute depends much more upon the character of its local habitation than many are willing to admit. How humiliating does it seem for institutions to proclaim that one of their chief objects is to create and foster a love for Art, and yet at the same time they may be occupying buildings which not only offend the taste of the refined, but are looked on as disgraceful even by the illiterate.

That I have reason for giving utterance to the above remarks, all who have had opportunities for inspecting Institution Buildings in various parts of the country—not even excepting the great metropolis—will readily admit. And I do believe the Society of Arts will render no mean service by collecting either drawings or photographic sketches of all the buildings occupied by the Institutions in Union. Such a collection would be deeply interesting, useful for reference, and highly suggestive; besides which, some time hence it would doubtless be regarded as a valuable historical record, especially when Literary and Mechanics' Institutions shall have attained a higher position as agents in the education of the people. I shall rejoice if any suggestion of mine aid in so good a cause.

Apologising for thus trespassing on your time,

I remain, Sir, yours truly,

JOHN WARREN, Hon. Sec.

SEWERAGE OF LONDON.

SIR,—It is impossible for any company or companies to take up the sewerage of London for agricultural or mercantile purposes, with profit, by any process which will not disturb the sanitary arrangements of London. Various patents have been taken out from time to time for deodorizing and consolidating the sewerage, all of which have signally failed. Companies have been formed and have spent many thousands of pounds of their contributors' money, with no results, or the least beneficial advantage, except to the promoters, patentees, and employers; all has been wasted and squandered away by useless experiments, whilst some schemes have proved a direful calamity and dangerous to the localities in which the experiments have been tried. To prove what I advance, and in truth of my assertions, I will take one patent which is now considered the best and most efficacious of all others, on account of its apparent simplicity; by this patent, the prime compound to effect the deodorizing is sulphate of alumina (nothing new), combined with charcoal and mechanical arrangements. To effect a deodorizing of the sewage by this one patent, it is necessary that ten grains of sulphate of alumina should be mixed with one pint of sewage, this is without the manipulation of the consolidation and materials necessary to form the animal and vegetable flocula into a solid mass for manure. Now, as London and the environs are daily being replenished by the water companies (without the effects of rain) to the extent of sixty millions of gallons of water, I will show that no company or companies can possibly consolidate the solids from this immense mass of water after it has been used and turned off into the sewers of London. For example:—ten grains of sulphate of alumina to one pint of sewage, gives four scruples to the gallon, or gives three and a-half pounds weight to the ton of sewage (without the other adjuncts), and as 240,000 tons of sewage are delivered daily into the Thames, without the effects of rain, it would require the enormous weight of 146,000 tons per annum of sulphate of alumina to effect the purpose proposed, the cost of which at the low rate of 3*l.* 10s. per ton, would be 511,000*l.* per annum, and this without any allowance for machinery, lumbering, and cartage. How is this plausible affair to be carried out? The only course the government has to take into consideration, is to convey the sewage to the salt water, where the chemistry of nature operates for itself. The mistake which has hitherto been committed, has been by allowing direct communication to the fresh water part of the tidal river, where fermentation ensues, and does not readily deposit. Take the sewage to the salt water part of the river. As salt, combined with alumina, which exists there naturally, consolidates the animal and vegetable matter without fermentation, *this* great sanitary measure will be accomplished. If you deem this of interest, I shall be happy to contribute more upon the subject.

I remain, your obedient servant,

G. BOCCIUS.

PHOTOGRAPHIC PAPER

SIR,—The difficulty which photographers experience in obtaining an unobjectionable paper, has long been under the consideration of Mr. Saunders and myself, and at length it appeared to us advisable to manufacture a few reams with special reference to Photographic purposes, and I have now the pleasure of forwarding you several reams prepared on various plans, and I have thought it might not be inappropriate to accompany the paper with a few remarks on the subject.

A French writer on Photography, M. Gustave le Gray observes; "The choice of paper is very important; too, much attention cannot be paid to it, especially for portraits."......"I prefer Whatman's paper, lightly glazed; the sizing with gelatine causes it to be rather less rapid in its results than French paper, but, for the same reason, it endures longer the action of the Gallic acid without injury, and thus the retardation is compensated. The paper of M. Lacroix is the most quickly acting of any, but requires to be well selected, the size not being sufficiently strong in all cases."

On the Continent paper is generally sized with farina, and to the presence of this starch is attributable the action of M. Lacroix's paper. Notwithstanding these commendations, which refer to the general character of the papers manufactured by the eminent firms named, all photographers whom I have had an opportunity of consulting, still consider a good paper to be a desideratum.

To ascertain and account in some measure for the cause of failure in obtaining a suitable paper, I may remind you of the various materials used in the manufacture of paper, and the processes they undergo.

1st.—The materials in general use are composed of hemp, flax, or cotton fibre, and a mixture of these is most frequently used, and with advantage, as far as regards paper for ordinary purposes. The subject has not been sufficiently investigated, but as no one can doubt that the fibres of these different vegetable substances differ, although it may be only slightly in their absorbent properties, in their power of transmitting light, and in their chemical affinities, hence, by the use of a mixture of materials in the same papers, an objectionable diversity in the photographic action is the result.

2nd.—The materials are boiled in an alkaline solution, and subsequently bleached by chlorine, either generated as gas on the premises, or obtained from chloride of lime. It is impossible, I believe, to entirely remove the chemicals, however carefully the pulp may be subsequently washed, and their presence interferes with the expected action of photographic chemicals; the photographer is not acting upon inoperative fibres, but upon equally active

substances, although more minute in quantity than those he has purposely introduced.

3rd.—The materials are next cut into small particles by passing them between fixed and revolving knives. If the cutters should happen to have been recently sharpened, small particles of the steel may be diffused through the pulp; and though so minute as to be of no importance in ordinary paper, they may have occasionally caused serious inconvenience to the photographer. The wearing of the bearings also tends to introduce small portions of brass.

4th.—According to the purpose for which the paper may be required, the material is ground finer or coarser, with greater or less care, and this frequently causes a difference of texture in the same sheet. By using a badly prepared pulp, a sheet of paper, although made of one material may present as great differences in absorbing and light transmitting power as fibres of different vegetables.

5th.—The mode of sizing materially affects paper; in this country sizing with gelatine is the process usually adopted, whereas, on the continent, the size is composed of farina and other ingredients.

From a consideration of these sources of evil, it appeared to us that many of them might be avoided by care; and with a view to test the matter, the papers sent herewith have been prepared. The papers have been made into different sizes, for facility of comment and reference, and I should wish them referred to as Nos. 1, 2, 3, 4, and 5, although they can all be made of any dimensions required, not more than six feet wide. It is intended to supply sheets gratuitously for the next three months to any photographer who may desire specimens, on application to the under-stated address,* after which period the paper will be obtainable through the usual photographic chemists. It being very desirable that the result of a series of experiments should be ascertained, it is suggested that all who may be so disposed should communicate the result of their trials, and, if found advisable, I shall be happy to report to the Society at its meeting in June, such particulars as may appear worthy of note, not disclosing the name of any individual without permission. From the information that may be thus obtained, it is proposed either to make further experiments, or further quantities of whichever sort or sorts of the present specimens may prove the most suitable, as the case may be.

Hoping that this attempt to remove some of the difficulties which impede the progress of Photography may be successful.—I remain, yours truly,

WILLIAM STONES.

THE NEW PROCESS OF MAKING BREAD.

Sir,—I beg to call your attention to a new process of making bread, the discovery of M. Journet, of Paris, and to enclose a report by three eminent French chemists upon its quality.

The Board of Directors and Guardians of the poor of the parish of St. Marylebone, upon the application of Messrs. Journet and Martin, gave permission to try the process at the bakery in the workhouse, on the 30th ultimo. I witnessed, in common with many other gentlemen, every process except the preparation of the secret ferment, and the result was as follows:

"Two sacks, which had been previously sealed, were taken from the store and used on this occasion.

"By the ordinary process the flour yielded, before baking, 90 loaves, 4 lbs. 7 oz. each, which, after having been baked, gave a net weight of 360 lbs. of bread.

"By the new process the flour yielded 136 loaves of the same weight which, having been baked, gave 529 lbs. of bread. Thus, numerically the yield was as 90 to 136, or about 51 per cent. in favour of the new process; and in weight, as 360 to 529, or above 47 per cent. in favour of the new process.

"The difference between the 47 and 51 per cent. i weight would have been yielded if all the loaves had been made of the same shape (the ordinary shape used in the workhouse); but as nearly one-half was made in long and round loaves, exposing a larger surface to the heat of the oven, a much greater loss of weight was sustained by them in the baking, than by the other portion, which was of the usual shape."

Every one, except Messrs. Journet and Martin themselves, seemed, not only satisfied, but astonished at the result. Those gentlemen, although they only profess an economy to the extent of 50 per cent., stated that they had, on experiments made for six weeks continuously in Paris, never obtained less than 58 per cent. The experiment had also occupied much more time than they expected, and was hurried at last, so that they did not consider the bread so perfectly baked as it should have been. For these reasons they requested permission of the Board of Guardians and Directors to permit them to try another experiment with half the quantity of flour, so as to take less time. The Board at once granted permission, and the second experiment was made on the 5th inst., the result being as follows:

"Half a sack of flour, weighing 140 lbs., was delivered from the workhouse store, to which the fermentive material of M. Journet was added, and thoroughly mixed. The dough being thus formed was made up and baked in the ordinary manner, the produce being 68½ loaves, each of the average weight of 4 lbs., or rather upwards; whereas, by the usual mode of making bread, only 45 loaves of equal weight would have been produced, the increase being at the rate of rather more than 52 per cent."

It is only fair to mention that the flour used on both occasions was 2nd of No. 2, such being the quality ordinarily used at the workhouse. Had the flour been of the first quality, M. Journet states the result would have been still greater.

M. Journet professes, from a given weight of flour, to make 50 per cent. more bread than can be made by the ordinary system, at an expense not exceeding four shillings per sack of flour, or an increase of 45 loaves, of 4 lb. each, for four shillings.

Without knowing what the materials composing the secret ferment are, we have the statement of Messrs Journet, Martin, and Monin to rely upon as to the cost of it, and their assertions as to the increased quantity produced from a sack of flour have been fully and fairly demonstrated by the results of the two experiments on the 30th ultimo and 5th instant.

These results, the importance of which it is difficult to over estimate, seem at first almost incredible, and the idea naturally occurs that something is added to the flour to directly increase the weight, just as sand is added to soap, forming what is called "sand soap." M. Journet's discovery does not appear to be of this nature, insomuch as the most careful analysis fails to discover in the bread made by his process any materials other than such as are invariably found in good bread.

Subsequently to the first experiment, Dr. Sayer had been requested by several members of the Board of Guardians to satisfy himself, by examination and analysis, as to the purity of the bread, and that gentleman expressed himself much satisfied with the result, not a trace of any foreign matter having been discovered.

I am, Sir, your obedient servant,

P. GRAHAM.

The following is an extract from the report of Messrs. F. Melier, E. O. Henry, and D. Lheritier, referred to in Mr. Graham's letter:

"The samples of bread submitted to our examinations were composed:—

"1. Of pieces or fragments of different sizes, weighing together about 900 grammes (about 2 lbs. avoirdupois English) very dry, and portions of a baking of a month previously, as we were informed.

"2. Of a piece of newer bread, but still forming part of

*Mr. T. H. Saunders, paper manufacturers, Queenhithe, London.

a loaf which had been baked twelve days before, as was stated to us.

"The last piece, notwithstanding its staleness, had not acquired that degree of dryness exhibited by the bread prepared after the ordinary method. It was homogeneous, and totally free from those small lumps of unmoistened flour which sometimes appear in ordinary bread. It could be cut and eaten without any difficulty. Its flavour was good, and devoid of all peculiarity; it had neither absorbed moisture, nor did it possess a bad smell. The paste was well raised, and the baking was perfect.

"The first pieces, very dry, having been enveloped in a clean wet towel, acquired a certain softness: on being tasted, they were found to possess the fine flavour of a bread of excellent quality.

"Chemical Experiments.

"Two hundred grammes (about seven ounces) of these fragments, saturated with pure nitric acid, were strongly heated in a vessel of platinum, until they were fully carbonised. The carbonaceous mass, having been reduced to powder, was treated by boiling water, and then acidulated with pure nitric acid: it was then filtered, and the filtered liquid evaporated to dryness.

"The filtered liquid, on being tested, furnished mere traces of iron common to all organic substances, and slight indications of phosphate of lime and magnesia, both of which are to be found in farinaceous substances of every kind. We could not, by the most delicate re-agents, detect the slightest traces of copper, zinc, or any other injurious metal.

"Having boiled another piece of the same bread in a sufficient quantity of distilled water, and converted it by this treatment into a paste, we passed it, by expression, through some clean fine linen. The clear liquid was of a light brown tint, scarcely affecting litmus paper, and of a sweet and agreeable taste. On becoming cold, it furnished, as a residue, a white precipitate of a feculent nature; but the latter could not be converted into jelly. Alcohol being poured into the liquid, developed in it white filamentary flakes, soluble in water without the aid of heat, and of a gummy nature. Evaporated at a moderate temperature to the consistence of an extract, an acidulous residue was obtained, brown, viscous, well-flavoured, and almost entirely insoluble in alcohol. It possessed all the characteristics of mucous or gummy substances.

"A piece of bread, of sound quality, prepared according to the ordinary mode of bread-making, having been subjected to a comparative examination, yielded a liquid sensibly more acid, less savoury, and which left a much greater deposit of feculent matter, and which, moreover, in cooling soon turned into a jelly. The liquor, when evaporated, furnished, during the process of evaporation, a similar jelly, which thickened on cooling; no doubt in consequence of the non-decomposition of a larger quantity of feculent matter during the course of the ordinary bread-making process.

"On the whole, the result of these experiments is to the effect, that the bread which we have been called upon to examine has all the qualities of the best prepared bread, and that such bread contains nothing whatever prejudicial to health."

CONTINENTAL SCHOOL-BOOKS.

Letter II.

Sir,—In your 66th number (Feb. 17) you inserted a letter I wrote concerning Continental School-books. I am sorry that I have been prevented from pursuing the subject more promptly. Having said something about Natural History and Physical Science, I proceed to Geography, and more especially Geography in its relations to Industry and Commerce.

I have never yet seen, either in England or abroad, any book which exactly meets my notion of what a School Manual of Commercial Geography ought to be; and I should think this is a subject to which the attention of the Council of the Society of Arts might wisely and usefully be directed. Commercial relations, however, necessarily constitute one of the topics handled, in some form or other, in every good geographical school-book; and on the other hand, no book can give an account of mercantile products without touching on geographical relations. Again, in treating of school manuals, books and maps must necessarily be mentioned together. Thus I may arrange as follows what I have to say under my third general head,—(a) Books on Geography in general. (b) Works treating of mercantile Products. (c) School Maps.

3. Physical Geography and Mercantile Products.—(a) *Books on Geography in general.*—Among the manuals which attracted my attention were the following:—Meineke, "Leitfaden der Geographie. Prenzlau, 1845." Volkmar, "Leitfaden der Geographie. Brunswick, 1845." Ungewitter, "Populäre Geographie. Leipzig, 1840." Daniel, "Leitfaden für den Unterricht der Geographie. Halle, 1851." Krumbach, "Leitfaden der Geographie von Deutschland. Nürnberg, 1853." Zachariä, "Lehrbuch der Erdbesch-reibung in Natürlicher Verbinching mit Weltgeschichte, Naturgeschichte, und Technologie. 4th Ed. Altona, 1844." (I believe there are more recent editions of this manual.)

Some other works deserve more than a mere enumeration of their titles. Among them is Merleker's "Kosmogeographie. 2nd Ed. Leipzig, 1848," one of the most remarkable specimens of German condensation I ever saw. Within the compass of a single 8vo. volume, it includes not only a physical description of the earth in its widest sense, and a historico-political geography with all the chief points of Greek and Roman topography, but also notices of the history of trade, of chartography, and of geographical discovery. Another writer of high repute is Volger. Besides publishing a "Handbuch der Geographie," in two volumes, he is the author of a "Lehrbuch" in two parts, "Erster Cursus or Leitfaden," and "Zweiter Cursus or Schulgeographie." The second of these, the eighth edition of which (Han. 1850) is now before me, is much used as a school-book in Northern Germany. After a brief introduction on mathematical and physical geography, it follows the usual order of countries in their political divisions. The excellent manual of Von Roon, "Anfangsgründe der Eru Vöker-und-Staatenkunde. 9th Ed. Berlin, 1853," which is used in the great Commercial Institute under Dr. Steinhaus, at Leipzig, follows a different method. It is divided into three parts, 1st. "Topische Geographie," or the consideration of the various parts of land and water on the globe in their relations of space and distance. 2nd. "Physikalische Geographie," in which the questions of elevation and depression, climate, &c., are considered. 3rd. "Völker und Staatenkunde," or geography in its ordinary political sense, including ethnology. The nearest approach that I have seen to a true commercial geography is the "Handelsgeographie und Handelsgeschichte," of Nischwitz, in three parts. The first part (3rd Ed. Leipzig, 1851) gives a classification of mercantile products, with reference to the countries whence they come, with notices of the details and circumstances of trade. The second part (1838) takes the different countries of Europe in succession. The third part (1845) embraces whatever is not European.

(b) I now come to *books which treat directly of the various articles of import and export, and indirectly of geography.* Instruction in mercantile products, or "Waarenkunde," forms a regular course in several German schools. A convenient manual is that of Erdmann. "Grundriss der Allgemeinen Waarenkunde. 2nd Ed., Leipzig, 1852," in which, after a general introduction, the various articles are described under the three heads of mineral, vegetable, and animal products. Hoffmann's "Encyklopadie für Kaufleute, Leipzig, 1852," is a commercial dictionary, like that of M'Culloch, but probably

much inferior. Beil's "Technologisches Wörterbuch" Weisbaden, 1853," is a comparative dictionary of English, French, and German commercial terms. The following are the titles of some publications which are useful in aiding and illustrating such a course of instruction as that to which I have referred:—Blumbach, "Handbuch der Technischen Materialwaarenkunde." Pesth, 1846. Zenker, "Mercantilische Waarenkunde." Edited by Schenk. Jena, 1853. Kersten, "Allgemeines Giftpflanzenbuch." Kersten und Linke, "Atlas der Giftpflanzen." Linke, "Atlas der wichtigsten Handelspflanzen." Schenck, "Atlas der vorzuglichsten Handelspflanzen zu Schwartzkopf's Lehrbuch der Colonial-und-Spezerei-Waarenkunde." Jena, 1853. Gaustein, "Von der Verbreitung der Nutzbarsten Pflanzen." Taech, Berlin.

(c) In my next letter I shall have occasion to speak of wall-maps; but I may mention here such *school-atlases* as I am more or less acquainted with. Those which seem to be most worthy of careful attention are Sydow's "Methodischer Hand-Atlas für das wissenschaftliche Studium der Erdkunde," 3rd Ed., Perthes, Gotha, 1850, and Vogel's "Schul-Atlas der Neueren Erdkunde." 6th Ed. Leipzig. 1848. The former is used in the Higher Commercial Institute at Leipzig, and is remarkable for its very clear delineation of physical features as well as its comprehensive exhibition of the facts of political geography; the latter is the text-book in the City Commercial Schools in the same place, and combines, along with clear and judicious maps, border-vignettes of characteristic products, costumes, and historical events. There is also a smaller and cheaper edition of Sydow's "Schul-Atlas:" and with the Atlas of Dr. Vogel (who, by the way, is the father of the celebrated African traveller) should be procured the "Hülfsbuch," which expounds some very important principles on which geography should be taught.

Perhaps no atlas is more used in German schools than Stieler's "Schul-Atlas" (33rd Ed. Gotha, 1853), with which it would always be desirable to have as a companion volume the "Supplementheft" which Berghaus has published at the same place, to illustrate the physical features of the earth. (6th Ed. 1851.) The following titles may conclude my list:—Bromme, "Atlas zum Kosmos. Krais und Hoffman, Stuttgart." Leichtenstern und Lange, "Schul-Atlas, Vieweg, Brunswick." Kiepert, "Compendiöser Allgemeiner Atlas der Erde u. des Himmels. Weimar, 1850." The mention of Keipert's name tempts me to speak of ancient Greece and Italy, but I must not be drawn aside from the subject before me. I may, however, just name, as an excellent and cheap manual for classical schools, Voigt's "Schul-Atlas der Alten Geographie." Berlin, 1852.

I am very imperfectly acquainted with French geographical school-books, but I believe they are much inferior. As regards school-maps and the teaching of geography generally, my impression is, that we in England, too, are still behind Germany.

Faithfully yours,
J. S. HOWSON.

Collegiate Schools, Liverpool.
March 30, 1854.

Proceedings of Institutions.

BATTERSEA.—On Tuesday week, Mr. Buckmaster, the secretary to the Literary and Scientific Institution, gave a lecture to the members and friends of the subscribers, on "Pneumatics." The lecture was illustrated by a variety of simple and familiar experiments, with models of pumps, fire engines, barometers, air guns, &c. The lecture was delivered in a conversational style, which gave great satisfaction. The vicar, in returning thanks to the lecturer, said, that he had never attended a scientific lecture when the subject had been so well adapted to the attainments of a public audience.

BASINGSTOKE.—The thirteenth anniversary of the members of the Mechanics' Institute, took place at their rooms, on Tuesday se'night. Mr. Wyndham Portal occupied the chair, supported by the Mayor, R. Coste, Esq., Aldermen Simmons and Hulbert, with several members of the Town Council and other principal inhabitants. The hon. secretary (Mr. Bushell) read a very satisfactory report of the society's proceedings during the last year, which was unanimously adopted. The present number of members is 198, being an increase of twelve since the last meeting, and the funds are in a flourishing state, leaving a balance this year in favour of the Institution, after all liabilities are discharged, of no less than 62*l* 17s. 8½d. The number of volumes in the library is 1393, and the number issued during the year was 3,823, or nearly 80 per week. Several important alterations in the rules and constitution of the society, calculated to extend its sphere of usefulness, by embracing a large proportion of the industrious classes, were recommended by the committee, and unanimously adopted. The unanimous thanks of the meeting were awarded to the president, vice-presidents, treasurer, secretary, committee, the mayor for the use of the Town-hall for lectures, &c. The following gentlemen were elected officers for the ensuing year. President, Mr. W. S. Portal; vice-presidents, the Mayor, Mr. R. Coste, Mr. Alderman Simmons, Rev. L. B. Washer, Rev. M. Hanison, and Mr. G. Filater; treasurer, Mr. W. Glover; secretary, Mr. F. W. Bushell; Committee of Management, Rev. E. Yeadon, Messrs. Lazonby, Devons. Machonochie, Beard, Pidgeon, Hulbert, Challis, F. W. Bushell, jun., Browne, Bransby, Toper, J. Smith, Attwood, Elford, Fistree, Gregory, G. Toyce, Hussey, Lucas, Jas. Moody, T. Vanner, Jlitz, and Chandler. During the proceedings the president adverted to the Exhibition of Works of Industry and Art, about to be held at the Town-hall, in connexion with this institution, and stated that a large number of favourable letters had been received from the neighbouring nobility and gentry, so that there was every prospect of the exhibition being successful. The Right Hon. the Earl of Portsmouth had announced his intention of becoming an annual subscriber of 5*l*. and had promised a donation of 10*l*. to the "Contribution Fund."

CROYDON.—A special general meeting of the members of the Literary and Scientific Institution was held at the Lecture Hall, on Friday the 24th ult., for the purpose of enabling the committee to apprise the members of their determination relative to the amalgamation of the two institutions. The report stated that, in consequence of a correspondence which had taken place between the committee and the trustees of the old institution, arrangements had been made by which the committee had obtained the use of a library, consisting of about 3,000 volumes, a small museum, and more comfortable and commodious reading-rooms. The plan which they intended adopting was at once to open a Morning Reading Room, from 10 a.m. till 5 p.m., for which a subscription of one guinea annually would be charged, to be paid in advance. The rooms to be again opened in the evening, from seven till half-past ten, for the usual subscription, viz:—Gentlemen 8s., and ladies 4s., per annum, payable quarterly, in advance. The room is to be supplied with three daily and the weekly local and a few London papers, and many of the best periodicals. The library the institution now possesses is, as soon as possible, to be removed to the Town-hall, where the reading-rooms will be in future.

LOUTH.—A lecture "On Botany" was delivered at the Mansion House to the members of the Mechanics' Institution and their friends, on Thursday se'nnight, by Dr. Balfour, F.R S., Dean of the Medical Faculty, and Regius Professor of Medicine and Botany in the University of Edinburgh. The subject was illustrated by nearly 100 coloured illustrations, entirely covering one side of the room. The Mayor, Mr. S. Frought, presided. The

ofessor led his hearers, step by step, through the ele- ents of the science; and it is believed that his lucid marks will have a tendency to increase the number of idents of a science, the pursuit of which is fraught with much pleasure and delight. The professor made some ell-timed remarks on the overwhelming evidence of a perintending and all-wise Providence, which might be und in the study of this beautiful science. Votes of anks having been passed to the lecturer and the airman, the meeting separated. The institution is debted to Dr. Dymock for the lecture, as it was through s instrumentality that the valuable services of the lec- rer were secured.

READING.—On Tuesday evening week, the concluding cture for the season was delivered at the Literary, ientific, and Mechanics' Institution, by Mrs. C. L. alfour, to the members of the above Institution, on e "Memorable Youthful Poets of the Present Cen- ury." Mrs. Balfour remarked that it was not edu- ation alone that produced the best poets—for some of e most talented had received very little—but had at- ained their eminent position through perseverence and udy. The lecturer made some observations on the eculiarities of the poems of Pollock, Kirke White, eats, Lord Byron, Shelley, and Longfellow, and to illus- rate the particular style and character of each, recited umerous selections from their most admired compositions. rs. Balfour spoke in very feeling terms on the sudden nd lamented death of Mr. Justice Talfourd, who was a ery intimate friend of the poet Shelley, and who had ssisted him in several of his poems. The lecture was oncluded with a consideration of the poems of Longfellow. At the close of the lecture, the Honorary Secretary rose and said, that in making choice of a new president, the di- rectors had borne in mind that they were seeking for a gen- tleman to preside over a Literary Institution—an institu- tion composed of those who attached no undue importance to adventitious circumstances or hereditary distinctions, a gentleman to take the post so lately and so worthly filled by the late Mr. Justice Talfourd; and with these consi- derations before them, one gentleman stood prominently forward in their estimation, one, too, who was emphati- cally "Talfourd's friend." They anticipated him in naming CHARLES DICKENS. That gentleman, who had refused similar offers from institutions of far greater pre- tensions than theirs, had replied that he could not do other- wise than accept it with a melancholy satisfaction, as it was "proposed to me in rememberance of his affectionate regard."

SEVENOAKS.—On Thursday, March 30th, Mr. G. Gros- smith delivered one of his humourous lectures, at the Literary and Scientific Institution, taking for his subject "English Notions of American Character," in which he gave a review of English criticism and American re- taliation, with amusing illustrations from the popular literature of both countries.

Miscellanea.

IRISH MANURE.—Mr. Tuckett, of Lonco, near Looe, in Corn- wall, communicated to a recent meeting of the Royal Agricul- tural society, the results of trials undertaken by him for the conversion of fish-offal into manure, and a statement of his mode of reducing animal substances, in the course of three hours, into a pulp, or jelly, preparatory to its being diluted with water for the liquid-manure drill, or mixed with a fine powder for drilling with seeds. He also referred to the plan he employed for separating the chief manuring elements from gas-liquor, by saturating it with common salt, and then filtering it through a layer of powdered peat-charcoal, mixed with two-thirds its quantity of dried clay, ground. Mr. Tuckett at the same time offered a suggestion that search should be made on the north coast of Africa, for deposits of the nitrates of potash and soda. He thought the present time was favourable for such inquiries in districts under the Mohammedan rule and he cited various extracts from Dr. Shaw's travels in those regions, showing the natural fertility that had from time imme- morial subsisted in certain districts, from no other apparent cause than that of the strong nitrous impregnation to which the soil was constantly subjected.

ROYAL INSTITUTION.—At the monthly meeting which was held on Monday week, the Rev. Mr. Barlow, the Secretary, reported that arrangements had been made for the delivery, *inter alia*, of seven lectures on Education, after Easter. Dr. Whewell will deliver the first lecture, which will be "On the Influence of the History of Science upon Intellectual Educa- tion." The second will be by Professor Faraday, "Observations on Mental Education." The remainder will be by Dr. Latham, Dr. Daubeny, Professor Tyndall, Mr. Paget, and Dr. Hodgson, who will treat respectively of the Importance of the Study of Language, Chemistry, Physics, Physiology, and Economic Science, as Branches of Education for all Classes.

MEETINGS FOR THE ENSUING WEEK.

MON. London Inst., 7.—Mr. W. H. Monk, "On Chamber Music."
Chemical, 8.
TUES. Horticultural, 3.
Pathological, 7.
Linnæan, 8.
WED. London Inst., 7.—Conversazione.
Society of Arts, 8.—1. Mr. Joseph Glynn, "On Water Meters." 2. Mr. B. Fothergill, "Description of Taylor's Water Meter."
Microscopical, 8.
SAT. Royal Botanic, 3½.
Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 6th April, 1854.

Par. Numb.
44. Local Acts—Reports from the Admiralty.
134. Shipping—Return.
150. Hops—Return.
157. Committee of Selection—Eighth Report.
109. Cholera (Ireland)—Abstract of Return.
53. Bills—Bankruptcy (Ireland).
56. Bills—Piers and Harbours (Scotland, No. 2).
Turnpike Trusts—Third Report by the Secretary of State, with Abstract of Accounts.
Protestants in Turkey—Correspondence.
Count Guicciardini—Correspondence.

Delivered on 7th April, 1854.

136. Register of Deeds Office (Ireland).—Return.
143. Churchyard, &c., (Metropolis)—Return.
149. Ventilation of the House—First Report from the Committee.
57. Bills—Devonport and Keyham Tunnel, (No. 2.) (as amended by the Select Committee.)
62. Bills—Railway and Canal Traffic Regulation.

SESSION 1852-3.

627 (3). Indian Territories—Index to Lords' Repor

Delivered on 8th and 10th April, 1854.

155. Metropolitan Commission of Sewers—Account.
133. Highland Roads and Bridges—40th Report of Commissioners.
170. Committee of Selection—9th Report.
64. Bill—Boundary Survey (Ireland).

SESSION, 1852.

989. Poor Rates—Return.

Delivered on 11th April, 1854.

137. Commissariat Chest Account, 1852-3.
152. Freight Money (Greenwich Hospital)—Return.
154. Packet Service—Return.
161. Army—Return.
164. Railway and Canal Bills Committee—4th Report.
58. Bill—Towns Improvement (Ireland), (amended).

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 7th*, 1854.]

Dated 23rd February, 1854.

436. C. Walker, Bury—Purifying water.

Dated 28th February, 1854.

478. T. Denny, Strasbourg—Engraving.

Dated 8th March, 1854.

553. W. J. Cookson, Newcastle on Tyne—Reduction of lead ores.

Dated 20th March, 1854.

651. E. De Mars, Paris—Windlasses. (A communication.)
653. J. Bird, jun., Manchester—Silk thread.
659. W. L. Webb, 11, New Broad street—Pulverizing, &c., quartz.
661. J. Perkins, Kennington—Metallurgy.
663. J. Young, East Smithfield—Brewing.

Dated 21st March, 1854.

665. W. Stevens, and W. Stevens, jun., Birmingham—Lenses.
667. J. Hansor, Wandsworth road—Gas.

Dated 22nd March, 1854.

669. R. Roberts and H. Coppock, Heaton Norris—Looms.
671. E. Keirby, Manchester—Reed for looms.
673. W. Fait, Goswell road—Ventilator.
675. H. Maderson, Clapham, and G. W. Warren, Lambeth—Gun locks.
677. J. Healey, J. Foster, and J. Lowe, Bolton le Moors—Cotton machinery.
679. W. D. Skelton, Leeds—Flax.
681. B. England, Leigh—Woven fabrics.
682. E. D. Coez, St. Denis—Printing and dyeing fibrous materials.
683. W. V. Greenwood, and J. Saxby, Brighton—Railway signal lamps.
684. F. Seiter, Interlaken—Tesselated woodwork for floorings, &c.
685. L. Whitaker and D. Ashworth, Haslingden—Power looms.
687. A. Lister, Birmingham—Metallic castings.
688. J. Newman, Birmingham—Metallic tubes.
689. S. Holman, Colney Hatch—Raising fluids.

Dated 24th March, 1854.

690. R. Montgomery, New York—Corrugated metals.
691. H. Room and W. Morton, Birmingham—Metallic bedsteads.
692. R. Doidge and J. Cloves, Birmingham — Rolls for shaping sweetmeats.
693. B. Fothergill and W. Weild, Manchester—Preparing the fibres of plantain, penguin, &c.
694. S. Humphreys, Green street, Leicester square—Fatty, oily, and resinous matters. (A communication.)

Dated 24th March, 1854.

696. W. Wood, Pontefract—Carpets.
697. E. Bagot, Llanelly—Rails for railways.
691. J. Lockhead, Kennington, and R. Passenger, Union Street, Southwark—Glass.
699. J. Robertson, Glasgow—Lifting or transporting heavy bodies.
700. W. Neilson, Glasgow—Marine engines.
701. T. Gibson and W. Knighton, Chesterfield—Moulding and casting metals.
702. T. J. and J. Smith, Queen street, Cheapside—Pocket books, portfolios, &c.
703. W. A. Biddell, Great Sutton street—Alarums.
704. G. Beaumont, Halifax—Hollow bricks.

Dated 27th March, 1854.

706. H. A. Archereon, Paris—Charcoal powder, &c.
708. F. Phillips, Downham—Cutting, &c., vegetable substances.

WEEKLY LIST OF PATENTS SEALED.

Sealed April 5th, 1854.

2275. Henry John Betjemann, of New Oxford street—Improvements in apparatus for fixing capsules on the necks of bottles and and other vessels.

Sealed 7th April, 1854.

2296. Joseph Porter, of the Salford Screw Bolt Works—Improvements in machines for drilling or boring metals or other substances.
2299. Thomas Lambert, of Short street, New cut—Improvements in ships' water closets.
2347. James Higgins and Thomas Schofield Whitworth, both of Salford—Improvements in machinery or apparatus for spinning and doubling fibrous materials.
2372. The Honourable Frederick William Cadogan, of Hertford street, May Fair—Improvements in the means of obtaining telegraphic communications applicable to armies in the field.
2373. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in drying grain, flour, timber, fruit, vegetables, and other substances.
2376. Frederick Samson Thomas, of 17, Cornhill—Improvements in the construction of railway carriages.
2409. John Norton, of Cork—Improvements in fire-arms.
2415. James Barton, of Robert street, Hampstead road—Improvements in fittings for stables.
2427. William Melville, of Burntisland—Improvements in apparatus for drawing ships out of water.
2449. Thomas Stainton, of South Shields—Improvements in steering apparatus.
2578. Edwin Kesterton, of Long Acre—Improvements in springs for carriages.
2592. George Frederick Parratt, of 27, Victoria street, Pimlico—Improvements in life rafts.
2761. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in straining mill saws.
2834. William Edward Gaine, of 4, Harewood street—Improvement in treating or preparing paper.
2956. Josiah Latimer Clark, of 2, Chester villas, Canonbury park South—Improvement in insulating wire used for electric telegraphs, with a view to obviate the effects of return or inductive currents.
40. Jesse Ross, of Keighley—Improvements in making compounds of chocolate, cocoa, and other ingredients for breakfast and occasional beverages.
88. Arthur Parsey, of No. 3, Crescent place, Burton crescent—Improvements in machinery for obtaining and applying motive power by means of compressed air and other fluids.
158. William Darling, of Edinburgh—Improvements in sewing machines.
198. Samuel Stack Stallard, of York street, Welford, Leicester—Improvements in the manufacture of knit fabrics.
212. Josiah Latimer Clark, of 2, Chester villas, Canonbury park—Improvements in apparatus for conveying letters or parcels between places by the pressure of air and vacuum.
226. Richard Garrett, of Leiston Works, near Saxmundham—Improvements in thrashing machines.
252. Francis Herbert Wenham, of Effra Vale lodge, Brixton—Improvements in fire-arms.
269. Charles Hastings Collette, of No. 57, Lincoln's inn Fields—Improved method of reducing ores.
278. Alfred Vincent Newton, 66, Chancery lane—Improvements in springs applicable to railway carriages and other uses.
291. Walter Neilson, of Glasgow—Improvements in blowing engines.
304. Alfred Vincent Newton, of 66, Chancery lane—Improved machinery for heckling flax and other fibrous materials.
339. John Rogers, of 170, West 21st street, New York—Preparation of asphaltum, coal tar, resin, resin oil, naptha, and turpentine, for the manufacture of lamp black.

Sealed April 11th, 1854.

2329. James Worrall, junior, of Salford—Improvements in the method of dyeing fustians and other textile fabrics, and in the machinery or apparatus connected therewith.
2330. Charles Rowley, of Birmingham—Improvements in ornamental dress fastenings.
2336. John Francis Porter, of Bessborough street—Improvements in the moulding of bricks and other articles of like materials.
2338. George Fredric Goble, of 15, Fish street hill—Improvements in apparatus for signalizing and stopping railway trains.
2339. John Morison and Daniel Hurn, both of Norton Folgate—Improvements in the manufacture of nose bags.
2343. Edme Jules Maumené, of Rheims—Improvements in the treatment of lignite or wood coal, and in obtaining various useful products therefrom.
2344. Robert William Waithman, of Bentham house, York—Improvements in apparatus for applying paint, varnish, and other liquid substances; and also for cleaning carriages, ships, roadways, houses and other buildings.
2346. George Bradley, of Castleford—Improvements in stoppers or covers for bottles, and in the tools or apparatus for manufacturing the same.
2395. John Palmer De la Fons, of Carlton hill, St. John's wood—Improvements in apparatus for measuring and indicating the distance travelled by a carriage.
2461. Joseph Beasley, junior, of Smethwick—Improvements in the construction and arrangement of puddling furnaces, which improvements are also applicable to other furnaces used in the generation of steam.
2608. Salomon Sturm, of Carpenter's buildings—Machinery for the manufacture of optical lenses.
208. Joseph Atkinson, of Richmond grove—Improvements in thrashing machinery.
231. Arnold Morel Fatio, and François Verdeil, both of Paris—Improvements in preserving animal and vegetable substances.
295. John Elce, of Manchester—Improvements in machinery for spinning cotton and other fibrous materials.
332. William Whiteley, of Lockwood, near Huddersfield—Improvements in machinery or apparatus for tentering or stretching woollen and other fabrics.
393. Edward Loysel, of Rue de Grétry, Paris—Improvements in apparatus for obtaining infusions or extracts from various substances.
460. Frederick William Alexander De Fabeck, of No. 18, Norfolk street, Strand—Construction of bridges, viaducts, lintels, beams, girders, and other horizontal structures and supports.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854.				
April 6	3586	Oil-cake Mill	Robert Lane	Cirencester, Gloucestershire.
" 7	3587	Fastening for Pocket-Books and Leather Cases	Abel Holloway	Birmingham.
" 10	3588	Teeth used in Bone-mills or Machines.	R. and J. Rankin	Liverpool.
" "	3589	Form of certain Parts of Machines used for Wringing and Mangling Clothes and other Articles	Williamson, Brothers	Stainton, near Kendal, Westmoreland.

Journal of the Society of Arts.

FRIDAY, APRIL 21, 1854.

EXHIBITION OF EDUCATIONAL APPARATUS.

The Council, considering that this Exhibition would be very materially promoted if in addition to the Council of the Society, a body of gentlemen specially concerned, or interested in education, could be associated with them, have formed the following Committee :—

H.R.H. PRINCE ALBERT, K.G., President of the Society
Adler, Rev. Dr., Chief Rabbi
Allies, T. W., Secretary Catholic Poor School Committee
Arnold, Matthew, H.M. Inspector of British and Welseyan Schools
Baber, Rev. H., M.A., Secretary and Chaplain of the Whitelands Training Institution
Baines, Rt. Hon. M. T., M.P., President of the Poor Law Board
Baines, Edward, President of the Yorkshire Union ot Mechanics' Institutes
Barlow, Rev. J., M.A., F.R.S., Secretary of the Royal Institution
Bellairs, Rev. H. W., M.A., H.M. Inspector of Schools
Berriedale, Lord
Best, Hon. and Rev. S., M.A.
* Bird, William
Birley, Rev. W., H.M. Inspector of Schools
* Boileau, Sir J. P., Bart., F.R.S. (V.P.)
* Booth, Rev. J., D.C.L., F.R.S.
Bowyer, H. G., H.M. Inspector of Workhouse Schools
Bristol, the Dean of
Bromby, Rev. C. W. H., Principal of Cheltenham Training School
Brown, T. B., H.M. Inspector of Workhouse Schools
* Carlisle, the Earl of, (V.P.)
Chambers, Robert, Edinburgh
* Chester, Harry
Clarke, Rev. S., M.A., Principal of the Battersea Training School
* Colborne, Lord, (V.P.)
* Cole, Henry, C.B.
Combe, George, Edinburgh
Cook, Rev. T. C., H.M. Inspector of Schools
Cornwell, Dr. J., British and Foreign School Society
Cross, Maurice, Secretary to the Irish Comissioners of Education
Crossley, John, British and Foreign School Society
David, Rev. W.
* De la Rue, Warren, F.R.S.
* Dilke, C. Wentworth, (V.P.)
Douglas, Jos., Glasgow Normal School
Dunn, H., Secretary of the British and Foreign School Society
Ellesmere, the Earl of
Ellis, William, Denmark-hill, Camberwell
*Ewart, William, M.P. (V.P.)
Forbes, Prof. E., F.R.S., Museum of Economic Geology
Fox, W. J., M.P.
Fulton, J.
*Gibson, Rt. Hon. T. M., M.P. (V.P.)
Graham, Peter (Auditor)
*Granville, the Earl (V.P.), Lord President of the Council
Grosvenor, Lord Robert, M.P.
Gurney, S., junr., Lombard-street

* Members of Council.

*Hereford, the Dean of
Hernaman, J. W. D., H.M. Inspector of Schools
Hodgkinson, Rev. G. C., Principal of Training School, York
*Hope, Henry Thomas (V.P.)
Howson, Rev. J. Saul, M.A., Principal of Collegiate Institution, Liverpool
Hudson, Dr. J. W., President of Lancashire and Cheshire Union of Mechanics' Institutes
Hughes, Edward, Head-Master of Royal Naval Lower School, Greenwich
Hughes, William, Training College, Highbury
*Hume, Joseph, M.P. (V.P.)
Hunt, Robert, Museum of Economic Geology
*Hutt, William, M.P. (V.P.)
Jacob, Rev. Dr., Head-Master of Christ's Hospital
Jones, Rev. H. L., H.M. Inspector of Schools
Kay, Joseph
Kennedy, Rev. W. J., H.M. Inspector of Schools
Latham, Rev. J., Secretary Derby Training School
*Lemon, Sir C., Bart., M.P. (V.P.)
Lichfield, the Bishop of
Lingen, R. R. W., Secretary Committee of Council on Education
Lonsdale, Rev. J. G., M.A., Secretary of the National Society
*Macdonald, J. C.
Mackenzie, Rev. C., M.A., Head Master of St. Olave's Grammar School, and Honorary Secretary of Crosby Hall Evening Classes
Middleton, David, H.M. Inspector of Schools in Scotland
Mitchell, Rev. M., H.M. Inspector of Schools
Moncrieff, Rev. G. R., H.M. Inspector of Schools
*Monteagle, the Lord (V.P.)
Morley, Samuel
Moseley, Rev. Henry, F.R.S., H.M. Inspector of Normal Schools
Norris, Rev. J. P., H.M. Inspector of Schools
*Overstone, the Lord (V.P.)
*Owen, Capt. H. C., R.E.
Parrington, Rev. M., Secretary Chichester Diocesan Board
*Pasley, Lieut. Gen. Sir Charles W., K.C.B. (V.P.)
*Peto, Samuel Morton, M.P., (V.P.)
Phillips, Sir Thomas, Honorary Secretary Welsh Education Committee
*Playfair, Dr. Lyon, C.B.
Potter, Cipriani, Principal of the Royal Academy of Music, London
Power, Rev. A. Bath, M.A., Principal Norwich Training School
Redington, Sir Thomas, K.C.B.
*Redgrave, Samuel (Treasurer)
*Rendel, James Meadows, F.R.S. (V.P.)
Reynolds, John, Honorary Secretary Home and Colonial School Society
Richson, Rev. C., M.A., Honorary Secretary Manchester Church Education Society
Rigg, Rev. Arthur, Principal Chester Diocesan Training School
Rogers, Rev. W., M.A.
Rowden, Rev. Dr.
Ruddock, Joshua, H.M. Inspector of Workhouse Schools
*Russell, John Scott, F.R.S. (V.P.)
Ryan, Vincent, Metropolitan Training School, Highbury
St. Asaph, the Bishop of
St. Paul's, the Dean of
Salisbury, the Dean of
Sandford, Rev. H. R., H.M. Inspector of Schools
Sandford, F. R.
*Saunders, W. Wilson
Scott, Benj., Working Mens' Educational Union
Scott, Rev. J., Wesleyan Education Committee
Sinclair, Archdeacon, Treasurer of National Society
Stanley, Lord, M.P.
*Stephenson, Robert, M.P. (V.P.)
Stewart, Rev. D. J., H.M. Inspector of Schools

Stokes, S. N., H.M. Inspector of Roman Catholic Schools
Stow, David, Free Church Normal School, Glasgow
Stubbs, Rev. H. C.
Symons, Jelinger, H.M. Inspector of Workhouse Schools
Tinling, Rev. E. D., H.M. Inspector of Schools
*Tooke, William, F.R.S. (V.P.)
*Tufnell, Right Hon. H., M.P. (V.P.)
Tufnell, E. Carleton, H.M. Inspector of Workhouse Schools
*Twining, Thomas, Jun.
Unwin, Rev. W. J., Principal of Homerton Training College
Warburton, Rev. W. }
Watkins, Rev. F. } H.M. Inspectors of Schools
Wilkinson, Rev. T. }
*Wilmot, Capt. F. Eardley, R.A.
Wilson, Rev. A., M.A., Head Master of National Society's Central School
Wilson, Dr. G., Edinburgh
Wilson, G. F.
Wilson, John, F.R.S.E.
Winchester, the Bishop of
*Winkworth, Thomas (Treasurer)
Yeats, J. Y.
Ysasi, Don Manuel de (Auditor)

The first meeting of the Committee was held at the Society's House, on Monday last, when the following resolutions, embodying the general principles on which the Exhibition should be conducted, were agreed to:—

1st.—The proposed Educational Exhibition is intended to illustrate the condition of Elementary Education in the United Kingdom and its Colonies, Continental Europe, and the United States of America, by bringing together complete collections of educational appliances and objects, such as—1st. Models of school buildings, arrangements, and fittings, Books, Maps, Diagrams, Models, Apparatus, &c., 2nd. Specimens of the work done in Schools, viz., Drawings, Writings, Needle-work, &c. 3rd. Laws of Public Instruction, Statistics of Education, School Regulations, Time Tables, &c.

2nd.—That the Exhibition be opened in St. Martin's Hall, in the last week of June, and be kept open for about three months.

3rd.—That it is highly desirable that means should be found to render the collection permanent, as the basis of a national Museum of Education.

4th.—That all Boards, Societies, and Individuals, concerned or taking an interest in education, be invited to cooperate in forming the Exhibition.

5th.—That all articles sent for Exhibition, should be accompanied by sufficient explanatory information as to their use; and that those from foreign countries should also be accompained, as far as possible, by an account of the system of instruction under which they are used.

6th.—That it is very desirable that articles sent for exhibition should be priced, and that the terms on which they can be supplied to schools should be stated.

7th.—That although the primary object of the exhibition has reference to the elementary and technical instruction of the working classes, articles suitable for use in Institutes, or in Trade or other schools, may be freely admitted so far as the space will allow.

8th.—That it is desirable that during the period of the exhibition, lectures be delivered, and papers read, on the subject of the collections exhibited, and on the theory and practice of education; and that arrangements be made for bringing together persons engaged in instruction, and for enabling them to profit by the information afforded, and to discuss practical subjects connected with schools.

9th.—That sub-committees should be appointed for Finance; Correspondence; Classification of the Collection and Arrangement of the Building; and Lectures.

TRADE MUSEUM.

18, John Street, Adelphi, April 17, 1854.

SIR,—The accompanying excellent letter, from W. Walker, Esq., Lieutenant-Governor and Commander-in-Chief of British Guiana, will, I am sure, be read with much interest by the members of the Society, not only as affording evidence of the active manner in which the Circular transmitted to the Colonial Governors, through the kindness of his Grace the Duke of Newcastle, her Majesty's Principal Secretary of State for the Colonies, is being taken up and responded to, but also, because it contains many valuable suggestions, and shows, at the same time, a true appreciation of the practical bearings of the Central Trade Museum, and the importance of establishing true corresponding ones all over the world.

I am, yours, &c.,

EDWARD SOLLY.

Sea View House, 2nd February, 1854.

My Dear Sir,—The receipt, by the last mail, of a communication from the Secretary to the Society of Arts in London, of which I enclose a copy, relative to the proposed establishment of "Trade Museums," induces me to carry out a desire I have long entertained, of addressing the Royal Agricultural and Commercial Society upon a subject to which some prominence was given in my Address at the opening of the Combined Court, namely, the more effectual development of the indigenous or naturalized products of this colony.

As this is one of the principal objects, if, indeed, it be not the chief object, for which the Society was instituted, as, set forth in the preamble to its Ordinance of Incorporation, I cannot be wrong in selecting it as the most suitable medium for awakening and directing public attention to the practical importance of the subject. In doing this, I prefe to adopt the unofficial style, as affording better opportunity for its free discussion.

In the first place, I would desire to remind you of the proposed formation of a Museum in Georgetown, and also of the contribution to the Great Exhibition at Paris in 1855, to both of which, I believe, we may consider the Society pledged; and in carrying out both, I have no doubt that the papers to which I have just alluded, will be found very useful.

But I think we may go further, and say, that the remarks of the Secretary to the Society of Arts are conclusive as to the expediency of looking beyond the merely ephemeral and transient effect of the exhibition of specimens of our sugar, our rum, our molasses; or those of our peppers, our cassaripe, or our starches. While the vein of practical application pervades the whole treatise, the following passage seems peculiarly apposite:—

"In developing the resources of a colony, we benefit the colonists, but, at the same time, our merchants, commission agents, brokers, and manufacturers, also derive advantage, and consequently, everything that tends to aid the spread of industrial knowledge, and to develope the unexplored riches of the natural productions of other parts of the world, must eventually benefit all classes at home."—p. 9.

The gratification of a natural and intelligent curiosity by the inspection of the contents of a Museum is laudable enough, but ought the influence of such a collection to rest there?

You are doubtless aware that Lord Harris placed at the disposal of the corresponding committee of the Society of Arts in Trinidad, the sum of £200 sterling, to be appropriated in prizes for the best specimens of native farming and garden produce brought forward at a public competition. The example might be, I think, usefully adopted here, and I am sure no one will hesitate to follow in such steps; but, in truth, the plan forms a specific feature of the Society's original constitution.

Few persons, probably, will be inclined to disagree, *in the abstract*, with the sentiments I ventured to express on

a recent occasion in regard to the extreme importance of rendering a comparatively inert mass of our population, whose only capital is their labour, profitable members of the community. The great problem obviously is—and it is one which many may regard as not to be satisfactorily solved—how can this be best accomplished, or rather perhaps, is it to be accomplished at all?

My own impression is, that the peasantry are not so far withdrawn from the influences of a higher civilization that their acquisitiveness—and it is really this alone which presents an assailable point—may not be aroused by the desire to make money and to realise property. But assuredly this will never be done if they continue to be left to themselves. That "indolence is natural to man" is an axiom which, if not universally true, must, I fear, be admitted to be very nearly indisputably so, as applied to the inhabitants of tropical regions, whose physical wants are few, and such as may be satisfied by the slightest possible personal exertion in aid of the prodigality of nature.

That it is possible, nevertheless, to excite a desire after something beyond the mere support of animal life, must be conceded upon the authority of actual experience; it remains to be ascertained whether such a desire cannot be more widely diffused and more permanently stimulated.

In such an undertaking as this, individual effort, however zealously and philanthropically exercised can effect but little, and that little will not last. Co-operation, on both sides, affords the only chance of success. Let us suppose that one, or a dozen, or twenty of our peasantry, of more than average intelligence and industry—I speak, of course, of those who have their own plots of cultivated ground, or are not within the definition of labourers usually working for hire,—should be induced to apply themselves to the task of improving any product already used, or of growing something not yet in common request; such attempts would probably realize but little to the parties themselves, and be but of small consequence to the community. So, if the encouragement of such efforts depend merely upon the interest felt and displayed by some two or three persons only, in the more influential classes, they must speedily wither, as everything will which is contingent upon the precarious life or variable temperament of individual men.

But can we not imagine the possibility of a Society like ours doing much, and permanently for both parties—producers and consumers—by a well organized plan of action, guided by rules and sustained by adequate resources, and, therefore, comparatively independent of the changes in the governing body? The attempt is, at all events, worth making, and I have already pointed out that the obligation of doing this has been voluntarily assumed by the Society—that, in fact, it constitutes as it were the consideration for which it demands public support.

In forming a Museum, or in arranging an Exhibition for ourselves, or in contributing to Exhibitions and Museums elsewhere, might it not, for instance, be practicable to direct the attention of the people, especially those settled away from the lands appropriated to the cultivation of the staples, to the innumerable materials of value which the colony affords, either as adding to the stores of alimentary products, or to those upon which the inexhaustible ingenuity of the artist and the manufacturer delights to be exercised? If a suitable locality were provided where such industrial results could be examined and experimented upon, it would be well worth while, on the part of the Society, to guarantee to the producer a reasonable profit upon his exertions, until time and opportunity were afforded to test the demand for the article in the open market of the world.

In a series of papers now publishing in Blackwood's Magazine, written I believe, by Professor Johnston, much matter of importance may be found connected with the questions now under consideration. I would just allude to the remarks on the Pepperworts, in p. 683 of the December number:—

"The pepperworts contain also a white crystallizable substance (piperin), which is said to equal quinine in its influence over intermittent fevers. All the three substances indeed, the oil, the resin, and the piperin, exercise a beneficial action in cases of intermittent fever; and hence no doubt one of the causes of their salutary action and extended use in hospital countries. We do not yet know upon which of these constituents the narcotic and intoxicating properties of the pepperworts depend."

Again, in the number for January, p. 94 *et seq.*, the remarks upon the plants containing theine of caffeine and other valuable principles; the substitution of the leaf of the coffee plant for the leaf of the tea plant; the advantage of an extended cultivation of the cocoas, and similar matters, are all highly interesting to us and worthy of mature consideration. To name other objects of inquiry is, perhaps, needless, since all cannot be particularized within the compass of a letter, but I enclose to you slips cut from publications shewing the profitable character of the plantain in an exportable shape, to which might be added the bread fruit; and also of the gum resins with which our forests abound.

Let it not be supposed, in urging these matters upon the Society, that I am either insensible to, or that I underestimate the obstacles which will have to be surmounted. There will be a cost of "passive resistance" to be overcome at first, on the part even of the very class whose improvement is most directly sought; there will, perhaps, be not merely apathy, but, shall we add, ingratitude displayed; many failures, much disappointment; but so has it ever been, and the *possibility* of the ultimate achievement of such a conquest as is here suggested ought to instil sufficient energy and hopefulness to enable us to disregard such influences, as the success itself, once attained, will assuredly more than compensate for the annoyance and the toil inseparable from its pursuit. History teaches us that no great forward movement in the condition of the human race has been the reward of other than repeated and painful, and for the time unappreciated and unrequitted, exertions: yet for our encouragement we may reverently quote the assurance that "a little leaven," patiently and judiciously applied, "leaveneth the whole lump," and doubt not that in due season the seed thus sown shall yield its fruit.

Perhaps it is hardly necessary for me to allude to one class of public men, who, more than any other, can become valuable auxiliaries to the Society in such an undertaking. I mean the Ministers of Religion, and their subordinates engaged in education. These must have the temporal well-doing as well as the eternal happiness of their people at heart: they know that industrious habits, neat and well-kept domiciles, decent clothing, and cleanliness of person, are as essential to the one, as purity of mind and the suppression of vicious inclinations are to the other: they will then be ready and willing to become the channels of communication between you and their people for the promotion of such ends—to stimulate the indolent, to encourage the timid, and to inform the ignorant.

I cannot, of course, pledge those who are destined to succeed me in my present office; but neither can I believe that any Governor of this Colony will hesitate to recognize the obligation I feel, to appropriate the funds under my control to the promotion of purposes of general usefulness: and therefore I will venture to assure the Society than any reasonable amount of pecuniary means likely to be required from time to time in carrying out such ideas as I have imperfectly indicated, will be cheerfully supplied.

I find that these remarks have extended to a length beyond what I had originally contemplated; but as I am unconscious of being actuated by any impulse but a conviction of duty, I shall offer no other apology for the trouble I am giving you.

Believe me, my dear Sir, very faithfully yours,

W. WALKER.

W. H. Campbell, Esq., LL.D.,
Secretary to the Royal Agricultural
and Commercial Society.

NINETEENTH ORDINARY MEETING.

WEDNESDAY, APRIL 19, 1854.

The Nineteenth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 19th instant, LORD BERRIEDALE in the chair.

The following candidates were balloted for and duly elected ordinary members:—

Bellford, Auguste Edouard Loradoux	North, Frederick
Caird, James	Woodd, Basil Thomas, M.P.

On the walls were suspended a number of very beautiful Photographic Views, taken by Mr. Robertson, of Constantinople, in different parts of Greece. The collection comprises about 40 views in Athens, including the Parthenon, the Temple of Theseus, the Erectheum, the Temple of Victory, the Tower of the Winds, etc.; 3 views at Egina; 2 at Corinth; 2 at Sunium; and, in addition, several views of the friezes of the Parthenon, and alto-relievos in the Temple of Victory. These pictures will remain on view at the Society's Rooms for a week or ten days.

The first paper read was

ON WATER METERS.

BY JOSEPH GLYNN, F.R.S.

The inhabitants of large and populous cities require an ample supply of water, as one of the first necessaries of life; and, as the people's wealth and civilisation advances, so does the demand for water increase.

If proof of this were needed, it would only be requisite to point to the splendid remains of the aqueducts and water-works of ancient times; for the rulers of all nations and ages, except our own, seem to have thought it their duty to provide water in abundance for the health and comfort of their subjects.

In this kingdom, however, and, more especially, in this great metropolis, the case has been otherwise, and the supply of water has been left to become a commercial speculation and a means of employing private capital.

The consequence of this has been a limited supply, delivered at intervals, and received in cisterns considered large enough to contain as much water as the family of the house required for a day or two days' use, and this state of things continued until the public became so much dissatisfied that the government has, to a certain extent, taken the matter into its own hands, and exercised the right of the strong against the water companies.

The people require a supply of water, when they want it, and as they want it; the wealthy inhabitants do not wish to be stinted; they demand a constant supply, continuous and unlimited except by their own pleasure, and to pay for what they have by measure. But they do not want the cisterns; they are cumbrous; they are inconvenient; they get foul. They wish to open their water tap whenever they like, and to have the water measured as they use it, like the gas, say at so much per thousand gallons.

In consequence of this demand many ingenious persons have turned their attention to the matter, and exercised their wits upon it, so that not less than forty patents have been taken for inventions for measuring water and other effluent liquids and fluids—some of these machines being applicable to gas as well as water.

These patents bear date from 1824 down to the present time, and the Society of Arts, being sensible how very desirable it is to have a really good water-meter, has twice offered rewards for the best machine of the kind.

The essentials of a good water-meter appear to be the following:—1. That it should correctly measure and show the quantity of water delivered under varying heads or pressures. 2. That it should not be liable to get out of order. 3. That it should be easily cleaned, oiled, or adjusted. 4. That the cost be not great, so that it may be generally used by householders.

The majority of the water-meters hitherto invented have been deficient in one or more of these essentials.

In the Jury Report of the Great Exhibition it appears that five of these contrivances were exhibited, but none of them so far perfected as to satisfy the conditions of a good meter. The jury do not even make honourable mention of any one, although they state how very much such machines are wanted.

Among so many inventive minds it may be expected that their ideas would take various shapes, but as very few ideas are original, so in the attempt to develope that of a water-meter, we find that some other machine or contrivance previously known has been taken as the starting point in most cases.

As the cistern of the London dwelling-house already mentioned receives and measures the daily supply, and by means of the well-known contrivance, called a ball-cock, closes the tap when the cistern is full, it was thought that by having *two* little cisterns with floats in them, connected with inlet and outlet valves, to be opened and shut alternately by the floats, the cisterns might be filled and emptied by turns. Their contents being known, and the ebb and flow of the water registered, a very simple and compact meter for water delivered in large quantities at a low pressure may thus be made.

The same idea of twin vessels, and a reciprocating action by means of a diaphragm, or flexible partition, has been further elaborated, something like the gas-meter upon that principle.

The reciprocating motion of a piston in a cylinder like that of a steam-engine has also been proposed, the water making its entrance and exit by means of a slide valve, and a tolerably good water-meter has been so made; but there is some friction of the piston, slide valve, "*tumbling bob*," and other mechanism, which requires some force of head or pressure to overcome. If the force or head of water be considerable its action is violent, but with an equable and moderate pressure an efficient, but not a cheap, machine may be constructed on the cylinder and piston plan.

Other forms of the steam-engine have also been proposed for water-meters, such as the disc engine, which combines the rotary with the reciprocating action. The water-wheel on a small scale, revolving in a circular case, has been tried in various ways, and is a favourite scheme, but not a successful one.

The clepsydra, or water-clock, in which water was formerly used to measure time, has been tried to measure water. In this a hollow drum or wheel, divided into chambers, has them filled and discharged in succession, each chamber or division containing an ascertained quantity of water; the wheel halts until it is filled, and moves when it over-balances and empties itself. Machines on this principle, however ingenious they may be, must be irregular in their action, and not suited for varying heads.

After this come drums of many shapes, some receiving the water at their centre, others at their circumference. Of those taking the water at the centre, some resemble a fan blast, some are like Appold's pump, and one like Barker's mill, which has ingenious contrivances for obviating friction, for continual lubrication, for straining the water as it enters, and for preventing acceleration of the drum or *mill part*, so to speak, of the machine, for which Mr. Siemens has a patent. There is a machine which is well known to sailors, and which has now for many years been before the public—Massey's Patent Log, for measuring the distance run by a ship. It is shaped something like a screw-propeller, but rather more like a

fish's tail, when it uses it as a propeller. Suppose this put into a pipe, it will register the *rate* at which the water flows past. This is another type, and there are modifications of it in portions of screws, drums with spiral vanes, and so forth. Mr. Siemens has a patent of this kind, in which two or three spirals, so to speak, revolve in opposite ways to prevent acceleration.

There are other forms also, but from what has been said, an opinion may be formed of the difficulties which attend the production of a perfect water-meter at a moderate cost; yet, as in most water-works now in course of construction a constant supply of water can be delivered at high service to the consumer, it is highly desirable that he should be able to avail himself of such advantages, by using what he pleases, and paying for it by the quantity consumed. It is to be hoped that some water-meter will be invented, or some of those before us will be so improved as to meet the demand, and satisfy this Society and the public.

Since my paper was written—indeed in the course of to-day, upon coming here to see the several models sent in to illustrate the subject—I found there was one meter not mentioned in my paper, the invention of Messrs. Hanson and Chadwick, of Salford, near Manchester. This invention differs altogether from the meters alluded to in my paper both in arrangement and action. It consists of two flat semi-circular bags of vulcanised India rubber, in which the water is in the first instance received, a wire gauze or sieve being introduced between the supply-pipe and the two inlet passages. At the other extremities of the bags there are openings which allow the water to pass into the meter. The water, on entering these bags, sets in motion three conical rollers attached to a centre-spindle in connection with the counting wheels and dial. These rollers are kept constantly revolving, each revolution registering exactly the contents of the bags. Each bag is kept constantly distended with the water it receives, and, as one of the rollers is constantly in advance of the outlet valve, whilst another is immediately behind it, the quantity discharged is kept up with great regularity. There is one of the machines on the table, and I have this afternoon seen one at work at the New River Water Works, where it delivered a steady stream of water at various pressures, and registered the quantity so delivered with considerable accuracy, and I am told that the difference of the delivery at moderate and high pressures is only 5 per cent.

The next Paper read was

DESCRIPTION OF TAYLOR'S WATER METER.

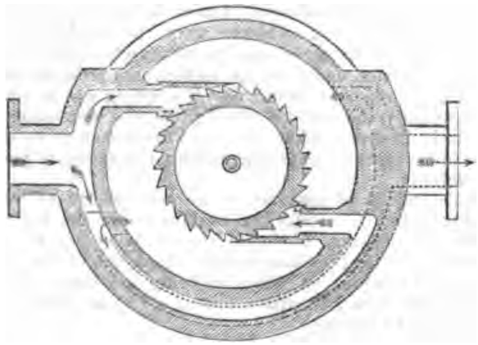
By Benjamin Fothergill.

The invention of a meter more than thirty years ago for measuring gas, was considered to be the achievement of a most important object; they are now almost universally adopted, and there can be no doubt the result has been a public benefit. A machine for measuring water subsequently claimed the attention of men of mechanical genius, and a great number of patents have been taken out from time to time for water meters, but that which appeared plausible in theory, was found inefficient in practice. About two years ago the Corporation of Manchester advertised for a water meter; this was responded to by a large number of persons, and meters of all descriptions were sent to the Water Works Committee, for their inspection and approval. The meter in question was required to sustain the greatest pressure; the flow must not be interfered with by obstruction or friction, so as to hinder its ascent to the highest point of its source; it must measure correctly under every variety of pressure, and when subdued to the smallest amount of inlet, must indicate the quantity passing through the meter; and durability or non-liability to wear and tear must be an important feature, without which the machine would be of little value.

Mr. T. Taylor, of the Patent Saw Mills, Manchester, has had his attention directed to the subject for many years. He succeeded about twelve years ago in constructing one on the low-pressure principle, which was pronounced by Mr. William Fairbairn, to be perfect in its kind; in his testimonial he said "I have examined Mr. Taylor's Water Meter, and from a careful consideration of the principle upon which it is constructed, I am of opinion that it is one of the most efficient discoveries that has ever yet been made for measuring out and duly registering unapportioned quantities of water, &c." Other individuals also bore the like testimony. Mr. Taylor has invented five meters, all varying in their principle and action; four of these were considered to possess considerable merit, but failed to overcome all the difficulties previously noticed; the last, however, has been pronounced by competent judges to be perfectly satisfactory. This he patented Dec. 15, 1852, and it has been before the Manchester Corporation. Since that time it has had the most severe tests, varying from the highest to the lowest pressure, and the result has been its approval by the Water Works Committee. There are now betwixt one and two hundred meters working in various parts of the country; they have been introduced into sixteen or eighteen towns, and have given universal satisfaction; there is one with a twelve inch bore pipe now working, and it is measuring the water supplied by the Corporation of Manchester to the township of Dukinfield, to the satisfaction of both parties concerned. The first meter made on this principle was fixed up at the extensive cotton-mills of Messrs. Birley, Manchester, where it has been working almost a year and a half, measuring from 35,000 to 36,000 gallons per day, and not the slightest disarrangement has occurred since it was fixed. Messrs. Birley have most confidently expressed their satisfaction in its principle and action.

TAYLOR'S WATER METER.

Fig 1.



The meter (fig 1) consists of a cylindrical vessel or cistern, of a size proportioned to the bore of the pipe that is to receive and discharge the water. Inside the above-mentioned vessel is a drum revolving on its axis in a vertical or upright position, and the stream passing through the meter is distributed upon the drum at each side of the meter. The registration is given by a train of wheels connected with the drum, and carried to the indicator, and by a combination of the undermentioned mechanical arrangement forms the water-meter patented by Mr. T. Taylor. The patentee claims for himself the undermentioned peculiarities connected with his water-meter:—

1st. The vertical position in which the drum is worked, the said drum being constructed of gutta percha, thereby preventing liability to collapse or corrosion, the said drum being made to the specific gravity of water.

2nd. That the quantity of water contained in the meter be sufficient to cause the drum to be buoyant, by which arrangement the drum is made to revolve by the slightest action of the water against the blades or buckets of the said drum.

3rd. The arrangement or construction of thoroughfares

or pipes outside the meter, communicating with the inside and round the drum for the delivery and exit of the water, and for causing a rotary motion in the water, thereby causing the drum, in addition to its buoyancy and vertical position, to be more certain of its liability to revolve under the slightest pressure of water. The construction of valves from the thoroughfares for the ingress of the water, which are so shaped that they bring the immediate action of the stream passing through the meter on the drum. The equal distribution and division of the stream (however small it may be), at each side of the drum, rendering its liability to wear and tear very slight, and whatever the pressure or power of the stream may be, by the above arrangement it is rendered neutral in causing more or less friction upon the axles or pivots of the drum, that friction being the same under any pressure and only sufficient to keep the drum in its position.

The above-mentioned valves are constructed after the plan of the common clack valve, which closes the apertures of the inlet, excepting a small tube fixed in the centre of the clack, and projecting so as to come into immediate contact with the buckets of the drum; the clacks are closed by a simple arrangement of a self-acting weight or lever above the valve, such weight being regulated by drawing it backward or forward on the lever (which being once regulated becomes a fixture and needs never be altered), so as to give more or less pressure on the clacks. The use or utility of these valves is occasioned by the fact that, although the drum may be neutral, yet there is necessarily a slight amount of friction to overcome in working the train of wheels to the indicator, which is done by the weight closing the clack and causing a compression of the stream, so that no water is allowed to pass but what forces through the clack tubes. This valve is only brought into requisition when a very small quantity of water is passing through the meter, and as the stream increases the leverage of the weight decreases, beyond which the valve is not required to ensure correct measurement. If, however, on the contrary, the weight should not decrease in its power upon the valves when the stream becomes greater, and there was an increased pressure upon the clacks (as would be the case if a spring was in place of a weight), the result would be that the measurement would be incorrect, which has been discovered to be the case after repeated experiments with the spring in place of weights.

Its certainty of registration, its non-liability to wear and tear, and its certainty of working under the highest or lowest pressure, is caused by the buoyancy of the drum, its vertical position and the adaptation of the inlet pipes and compression valves to bring the stream, however small, into immediate contact with the drum and causing it to revolve.

The Waterworks Committee have ordered a variety of meters from Mr. Taylor, and, no doubt, as the merits of this invention become known to water companies, they will be generally adopted, and will be found to be a regulator of great economy, and will be estimated by the public as a protector of their just rights.

DISCUSSION.

Mr. Chadwick wished, in making a few observations on the subject, to disclaim in the first instance being the inventor of the meter last brought under notice by Mr. Glynn, the design of it having been brought to him by a working plumber, George Hanson, of Huddersfield. He (Mr. Chadwick) was officially connected with the waterworks at Salford, and therefore it was that he had been led to take an interest in the subject, the Corporation being especially desirous that the quantity of water used should be correctly registered. They had tried various meters, but none of them had acted with the regularity and accuracy of that now upon the table (Figs. 2 & 3), with which he had been experimenting for the last 18 months. Mr. Glynn had very correctly described the construction of the meter, which he believed had this advantage over all others, that, being air tight, it would register any quantity of water used, however small, up to 1000 gallons per hour, which other meters would not do.

HANSON AND CHADWICK'S WATER METER.*

Fig. 2.

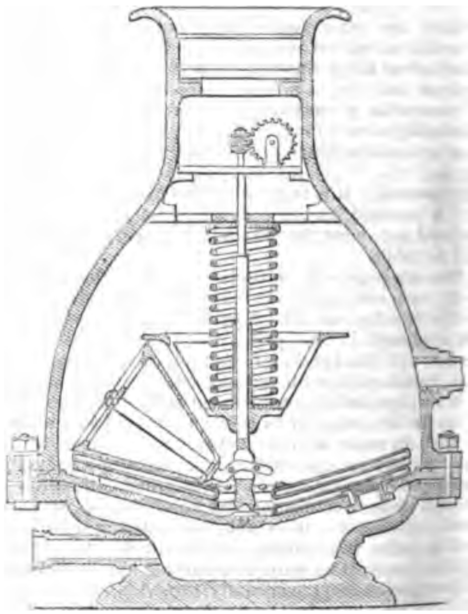
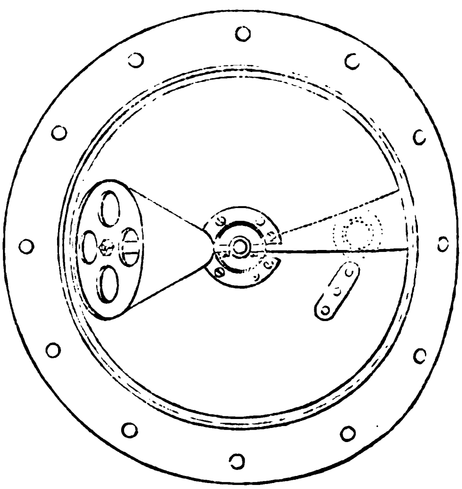


Fig. 3.



In saying this he did not wish to detract from the merits of Mr. Siemens' and Mr. Taylor's inventions, to which he was willing to give all praise. The first objection that would be raised by most persons to Hanson and Chadwick's meter would be as regarded the durability of the material used for the bags through which the water had to pass. He was assured by Mr. Mackintosh, the patentee of the vulcanised India-rubber, that however long it was exposed to

* These wood-cuts were made from the drawings attached to the specification. Since the patent was taken out, several alterations have been made in the details; the spiral spring has been dispensed with; the bottom of the cylindrical vessel has been made flat instead of inclined; three rollers are used in place of one—and a wire gauze or sieve has been introduced between the supply-pipe and the inlet-passages.

the action of the water it would neither decay nor deteriorate; and as regarded wear and tear, from the form of the rollers there would be no friction upon the bags by which they could be injured. He had, therefore, no hesitation in saying that it would last in perfect order at least seven years—Mr. Mackintosh said twenty years. As to an objection that the bags might get unduly inflated, experience proved to him that that could never happen, as, when the rollers passed over the valves or openings in the bags, they never got an impetus in advance of the water; and a pressure of 300 feet had no greater influence upon them than a pressure of 3 feet, the rollers always going before the water. He might observe that he had not brought the meter under notice in his own neighbourhood, and, indeed, the first place in which it had been seen out of the workshop was at the works of the New River Company. He believed that this meter was a good contribution towards the production of a perfect water-meter, and if it led to that result he should feel himself amply repaid for all the trouble and anxiety he had had with regard to it. He believed that no meter had yet been made so simple in construction; and having just been asked what would be the expense of it, he might observe that a one-inch meter, such as that on the table, would not cost more than £5 or £6, and a two-inch meter certainly not more than double that sum.

The CHAIRMAN could not allow Mr. Chadwick to depart without returning the thanks of the Society for his attendance there that evening. As regarded the durability of the material of which the bags were constructed, he could in some measure confirm the opinion of Mr. Mackintosh. He had had something to do with vulcanised India rubber, having used it for springs in an invention which he had patented, and, though he had had it at work for upwards of twelve months, not one of the springs had broken, though they had been actually subjected to the action of oil instead of water.

Mr. FOTHERGILL, in explanation of his paper, pointed out upon a plan the various portions of Mr. Taylor's meter, and stated that a valve had been so arranged as to regulate the stream of water, however small, so as to prevent too great diffusion, and thus cause it to impinge directly upon the drum. The meter would register 75,000 gallons an hour.

Mr. SIEMENS said he had, several years ago, directed his attention to the production of an efficient water-meter, and Mr. Glynn having mentioned in the paper the result of his labour, he felt called upon to offer to the meeting a brief description of the contrivances he had adopted with considerable practical success. Fig. 4 was a sectional elevation, and Fig. 5 a plan of one variety of his meter, and Figs. 6 and 7 represented the working parts of another.

SIEMENS' PATENT BALANCE METER, WITH HELICAL BLADES, TO WORK UNDER PRESSURE.

Fig. 4.

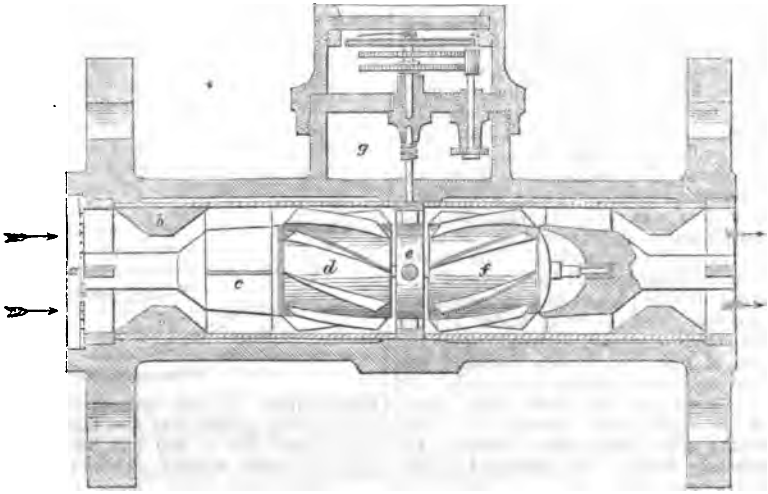
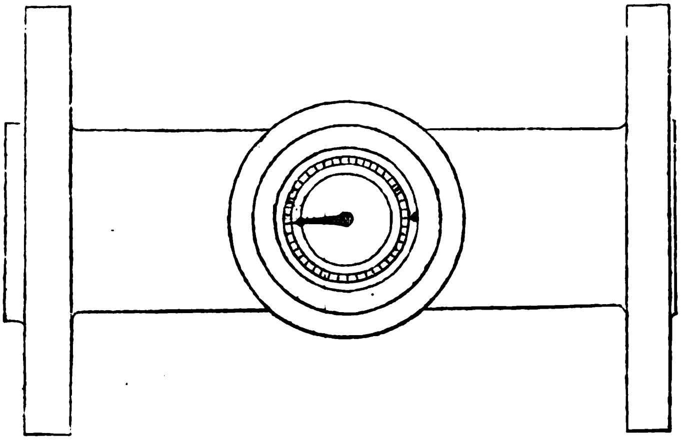


Fig. 5.



Although very different in appearance, the two constructions, nevertheless, involved the same principle of action, namely,—the water acted by its impact upon oblique vanes that glided edgeways through the moving column, without interrupting or impeding the same, and that communicated their motion to a counter, the difference between the two being, that in the first arrangement the water moved in a direction parallel to the rotating axis, and, in the second, from the axis outwards. The water entered the meter, Figs. 4 and 5, through a grating, and meeting the sides of the inverted cone (*b*), it was directed towards the axis, from whence it spread again outward over the conical block (*c*). The object of this operation was to spread the moving column of water uniformly over a measured annular area, after which there remained only to measure correctly the distance through which that column moved, and to register the same in expressions of gallons or other quantities upon a counter. For this purpose two drums (*d*) and (*f*), were provided, which were geared together, but were quite free to revolve in opposite directions, being made hollow, so as to float in the water, and all side strain upon the bearings being carefully avoided. The first drum was armed on its circumference with a set of right-handed, and the second with a set of left-handed screw vanes, of the same pitch, and of correct form, being cast of white metal in metallic moulds, specimens of which were placed on the table. The water was directed by stationary vanes upon the block (*c*), in a parallel direction against the vanes of the first screw drum, which it would turn in the exact ratio of its onward course, provided there was no friction. In proportion, however, as there was resistance the water would be deflected from its course, and would meet the vanes of the left-handed screw drum in a more obtuse angle, which tended to drive the same at an increased velocity, and, reacting upon the first drum, produced a remarkably uniform rate under the most variable circumstances of pressure. The motion of the drums was communicated to the upright spindle working in the chamber (*g*), where the motion was reduced several thousand times by screw gearing, after which it passed into the upper or counter chamber, through a stuffing box. The counter consisted of two wheels of 100 and 101 teeth respectively, both gearing into the driving pinion—the one carrying a dial with 100 divisions, and revolving under a fixed pointer; and the other carrying a hand upon the dial. A reduction of from one to ten thousand was thus obtained, and registered by the two hands. Of these meters a great number had been used, and were found to work very correctly for from six to fifteen months, after which time, however, the spindles were frequently found to be destroyed by the corrosive and gritty nature of the water generally supplied to towns. It was, however, necessary that a meter should work for years without requiring the attention generally bestowed upon mechanism, although placed under the influence of many destructive agencies. These considerations determined him in favour of the construction with spiral vanes, as represented in elevation by Fig. 6, and in plan by Fig. 7, without the casing and counter, which latter was the same as before described. The water entered the revolving drum through the inlet (*a*), and, spreading outward, impinged upon its spiral sides, which yielded to the impact, and allowed the water to issue through two or more outlets at the circumference. The compensating agencies in this meter were two flys or wings (*c c*), which were dragged with the drum through the water, and which retarded the same in a greater measure at high than at low velocities. By this means, and by judicious proportions between the inlet and outlets of the drum, a rate of motion was obtained which was strictly proportionate to the quantity of water passed through, either at a high or low velocity. The principal advantage in this meter over the previous one was, that it had but one step or bearing, which was effectually protected from the water by working in a closed chamber

SIEMENS' PATENT BALANCE METER, WITH SPIRAL BLADES TO WORK UNDER PRESSURE.

Fig. 6.

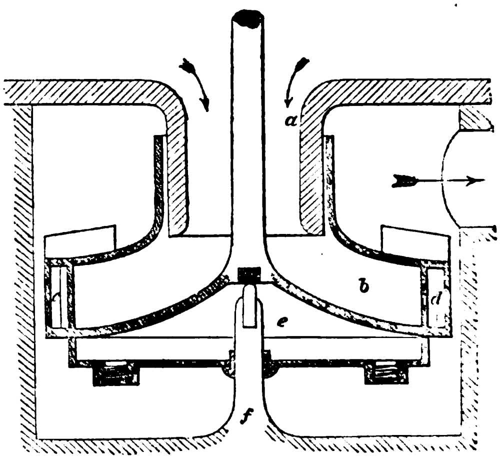
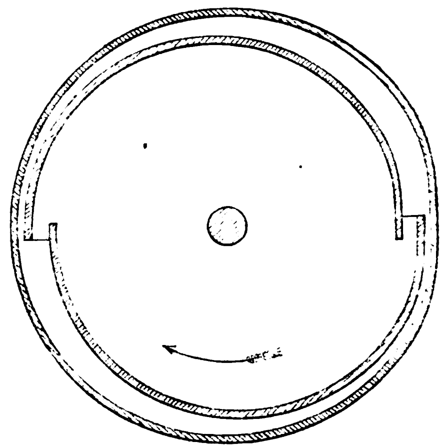


Fig. 7.



filled with oil. In like manner the chamber containing the reducing gearing was also filled with oil. Of these meters from 200 to 300 had been in operation for upwards of twelve months, and no deterioration had been observed in their working parts. Both these varieties of meters possessed the essential requisite of overcoming casual obstructions, being powerful re-action propellers. In his experience, he had been struck with the powerful effects of concussions in the water-mains, caused by the shutting of sluice-valves. In some instances a thick brass plate, dividing the counter chamber, had been bulged upwards, indicating a pressure of several hundred pounds per square inch. For this reason he doubted very much the success of a piston meter, or, indeed, any meter which intercepted the flow of the water.

The CHAIRMAN said that, having heard the explanations relative to these different meters, the Society would now be glad if any gentleman present would give them a few practical hints on the subject, to point out any defects there might be in the meters before them. There could be no doubt that it was of the utmost importance, in order to ensure a proper supply of water, that they should be in possession of a good and perfect meter. If they went back to the ancients, they would find that the Romans had constructed aqueducts—splendid works of art, of which no description could give an idea—to convey that most important element of comfort, water, to Rome. When he first saw these aqueducts, perhaps he exposed

his own ignorance by expressing his astonishment that the Romans had been so ignorant as not to know that water would always rise to its own level. Had he first visited Pompeii, possibly he should never have made that remark. In that city water-pipes were laid down on the same system as in London at the present time, and it was remarkable that they had not yet the advantage of a good meter, by which every person could tell the quantity of water he consumed, and without which they would never get a good and constant supply of water at high pressure in any town.

Mr. Yates had only heard of the intended discussion that morning, or he would have been better prepared to make some observations on the subject. He held in his hand one of Harrison's water and spirit meters, which was distinguishable by its extreme simplicity. The peculiarity of this meter consisted chiefly in employing the pressure of the fluid to act against two flexible diaphragms placed between chambers, into which it was admitted alternately, and which diaphragms yielded to the pressure alternately in opposite directions, displacing at every movement from the one chamber a quantity of water equal to that admitted into the other. Motion was thus given to spindles, which was ultimately communicated to the slides for the inlet and outlet of the water spirit, and to the registering and indicating apparatus.

Mr. Chrimes, the manufacturer of Mr. Siemens' meter, produced a small meter, capable of registering 300 gallons of water an hour, which he took to pieces and explained. He stated that the great difficulty which existed in the construction of a good meter was, to prevent the water getting to the clock-work, which it was liable to do, and thereby destroy its efficiency. In Siemens' meter this was accomplished by the clock-work of the dial being enclosed in a chamber filled with oil, the oil having the effect of preventing the deposit of calcareous or other matter from the water. The price of the meter he held in his hand would be 73s.; one measuring 600 gallons an hour, 94s.; 1,200 gallons an hour, £5 5s., and larger ones in a similar proportion. In conclusion, Mr. Chrimes stated that 300 of these meters had been at work during the last year, and that there had been no fracture in any one of them, with the exception that eight or ten had been burst during the late severe frost.

Mr. Greaves, of the East London Water Works, had attended that meeting rather to learn than to instruct; but he might observe that, knowing the value of securing a correct measurement of water, he had made various experiments, with a view of ascertaining how that object might be accomplished. Hitherto the meters produced had been of two descriptions—the piston and the screw—to which an addition had lately been made by Mr. Siemens' re-action meter, on the principle of Barker's mill, and by that of Messrs. Hanson and Chadwick, produced that evening, neither of which he had as yet tested. The results of his own trials had led him to the conclusion that for the measurement of small quantities of water, at a low pressure, the piston meter was the best—whilst, for large quantities and high pressure, the screw meter was preferable. With regard to Mr. Chadwick's meter, he was himself afraid that there would be great friction and that a variable supply, through a varying pressure on the bags, would be thereby given. He had a tank, twelve feet wide by three or four feet deep, for the purpose of trying experiments, and though many inventors had brought him their meters for trial he could not say that he had satisfactory results to communicate to the Society. It appeared to him that nothing was more easy than to construct a bad meter—but a good one was the difficulty. Nearly every meter he had seen would register the quantity of water consumed with an uniform pressure and draught, but with a varying pressure and draught the result would be very different.

Mr. Mead was rather pleased to hear what had fallen from the last speaker, as his experience of water companies led him to believe that it was not desirable that they should have such a thing as a meter. Water was six times the price of gas, though the companies did not charge it so, not being able to prove the quantities used.

Mr. Harry Chester, as one of the public, expressed his conviction that it was highly important to the whole population that they should have a good meter, applicable to every house, as by that means alone could they ever expect to get an improvement in the quality of the water supplied to them. In his opinion nothing was more absurd or unjust than the system of charging for water according to the number of rooms contained in a house. He did not say that the Water Companies were conscious of acting unjustly, because they had not yet found out the means by which they could charge every individual according to the quantity consumed. It would appear perfectly ridiculous were a butcher to charge for his beef, or a bootmaker for his boots, according to the number of rooms a man had in his house; and, in his opinion, the principle upon which water was so charged was equally ridiculous and unfair. It was highly important to the health of the community, that water of the best quality should be supplied to the public, but there was nothing to tempt water companies to improve their supply. Sometimes, under the temporary influence of parliamentary inquiries or other agitation, they heard of various attempts being made to improve the water supply, but when the pressure passed away the promised improvements passed away also. Under the present system competition was altogether out of the question, and the consumer was obliged to take his supply of water from any company which had the monopoly of the district in which he resided. He believed that the water supply would never be placed upon a proper footing until a good and cheap water-meter was introduced into the house of every consumer, when the companies would have this inducement to improve the supply—that the quantity consumed would be increased according to the quality of the article supplied. He did not expect that the water companies would exert themselves in the matter, and therefore the public ought to take it into their own hands, and agitate for the production of a perfect meter, by which they could have a good supply of water of the best quality at a fair and equitable price.

Mr. Fothergill was in no way interested in Mr. Taylor's meters beyond being consulted by that gentleman, but he knew that in Manchester the proprietors of steam-engines had found the meters very valuable as a means of testing the quality of the coal consumed by the quantity of water evaporated. A friend of his who had three meters, told him he was saving more than £100 per annum by the experience he thus gained of the quality of coal from different collieries, which enabled him always to obtain a supply from that colliery the coal from which he found to be most economical.

Mr. G. Cape, Secretary to the Lambeth Baths and Wash-houses Company, would not offer any observations upon the merits of the various meters upon the table, as he was not an engineer, but would remark that one of the meters upon Mr. Siemens' improved principle was now in work at the establishment of which he was the secretary, and although it had not been tested by Mr. Simpson, the Engineer to the Lambeth Water Works, from whence they obtained their supply, he believed it worked accurately, and he knew it had passed 1300 gallons in the space of one minute. He thought it fair to state, with respect to Mr. Siemens' meter, that one had been in use at the St. Giles' Baths and Wash-houses for some time, and that it registered to the satisfaction both of the Committee of that Institution and the Water Works Company that supplied it. The great desirability of an effective water meter, that would set at rest the discrepancies between the amount of water that consumers imagined they used, and water companies that they supplied, could not be over estimated. As an illustration of the great difference between the quantity of water supposed to be used and supplied, he might mention that the Lambeth baths for some four months were obliged to use water without any

method of registration; when the calculations came to be made the Water Works believed the Baths Company had used fourteen million gallons of water, and the Baths Company, after most carefully going into the matter, felt convinced that, at the outside, they could not have used more than eight million gallons. If a correct meter could have been obtained this great doubt would not have arisen. He merely mentioned this fact to strengthen the assertions of some of the former speakers, who had shown the great want of a water meter.

Mr. Wright had had more experience with regard to gas than to water meters, though he had invented one of the latter himself. The meters brought before them that evening were of two descriptions, inferential and absolute measurers. Mr. Siemens' was an inferential and not an absolute measurer, the quantity consumed being inferred from that received by the meter. Such an instrument would never do for small consumers, who only required occasional and intermittent supplies, although it would do very well for establishments in which large quantities were used, and where the stream was kept constantly flowing. In order to be beneficial to the public generally, a meter must be an absolute measurer, and he believed that that could best be accomplished by means of a piston meter. Mr. Taylor's meter was also inferential, and would, therefore, be equally inapplicable to the wants of small consumers. With regard to Mr. Chadwick's meter, it appeared at first sight to be very efficient, and not likely to get out of order, but any practical man, with a very little reflection, would see that there was nothing more probable than that it would do so. In the action of the rollers upon the bags, if any hard substance got under the rollers, it would stop the egress of the water, and destroy the action of the machine. They could not make the holes of any gauze or sieve so small as to prevent calcareous and other deposits passing through with the water. There was no difficulty in measuring the quantities of water supplied to baths and washhouses, or other large establishments; indeed, that might be done by a force pump, or by a variety of machinery of a costly description. What they ought to ascertain was, the average price paid for water by each individual per service pipe. He calculated it at 6s. per thousand gallons, which was about 50 per cent. cheaper than gas. The average cost of gas to each consumer was about 3*l.* per annum per service pipe, and he did not believe that the average consumption of water per individual per service pipe exceeded 30s. per annum, in consequence of the large number of small consumers.

Mr. Greaves stated that the price of water was about 3s. per 1000 feet.

Mr. Wright said that that only carried out his argument. The most economical meter produced to them that evening had been stated to cost 73s., and to fix it would probably cost 10s. or 20s. more. Now was it likely that any person would go to an expense of £3 or £4 to measure that which would probably not cost half that amount per annum. If fruit was sold in the street and scales to weigh it were so dear as to double or treble its cost, did they not suppose that the scales would be dispensed with, and the price better adjusted by selling the fruit by handfuls? In order to make water-meters available to the general consumer, they must be supplied at a cost not exceeding 15s., whilst the fitting up should not incur a further expense of more than 2s. or 3s. As he had already stated, there would be no difficulty in making a perfect machine for large consumers, but the difficulty existed in obtaining one sufficiently cheap for general use.

Mr. Yates stated that the meter which he had produced would only cost 35s., whilst it would measure the water with accuracy to half a pint.

Mr. Chester asked Mr. Wright whether he did not think that his argument stood equally as much against gas-meters, which were in general use.

Mr. Wright replied in the negative, as the meter in the case of gas, bore a nearer relative price to that of the article consumed than it would with regard to the water. He had supposed that the average price paid per service pipe by each consumer of gas was £3, whereas for water it was only half that amount, or 30s., and therefore the water-meter ought not to cost more than half as much as the gas-meter. He believed that many small cottages did not pay more than 10s. per annum for their water, and how could the holders of such houses afford to pay an additional shilling or two for the interest on outlay, and the keeping the meters in repair. The fact was, that water was much lower in price than gas, and any addition to its cost would press heavily on the smaller consumers, who were not also consumers of gas. There was also a greater difficulty in making a cheap water-meter than a cheap gas-meter, as the water would force its way through the stuffing-box, and thereby destroy the action of the index. The price of a gas-meter for two lights was 24s., and 5s. or 6s. for the fixing; and looking at the relative price of the two articles, the cost of a water-meter ought not to exceed that amount. In reply to a question from Mr. Chester, Mr. Wright said that the tenant either paid for the gas-meter or rented it from the company at 4s. per annum, being an addition of ten per cent. on the lowest charges of about £2 per annum, which would be a very serious impost on the lower class of water consumers.

Mr. Adams was connected with a company for the supply of water to the City of Amsterdam, where they had twenty-four or twenty-five thousand houses to supply. The capital of the company was £200,000, which had been sufficient to buy the land, pay for the engines, and construct all their works. The authorities of Amsterdam, being very desirous of having the water supplied paid for by measurement, he had inspected a large number of meters, and he found that the price would be about £3 each, which would have caused an addition of £70,000 to their capital of £200,000. This would have necessitated a greatly increased charge to the consumer. He found the inhabitants of Amsterdam very ready to take the water, but there was great difficulty in inducing them to pay for the pipes in their houses, and they would not pay for meters; and the Company was, therefore, compelled to resort to the old system of the rule of thumb. The company had recently sent over one of Mr. Siemens' meters to be put up at the railway works, and he was quite sure that when an available instrument was invented no water company would object to its general application to the houses of its customers.

Mr. Glynn stated, that Parliament had recently insisted that there should be a constant and continuous supply to the houses of the metropolis, and that could not be done without the assistance of a meter. He believed that the discussion of that evening would, by directing attention to the subject, tend to the production of an instrument through which justice might be done both to the consumer and to the supplier.

The Secretary, to show the injustice of the present system of charging according to the number of rooms, stated that the Society had to pay £8 8s. per annum for their water rate, notwithstanding that the house was not used as a dwelling, and, consequently, their consumption of water was very small.

Mr. Scott trusted that when a good system of measuring was discovered, no consideration of expense would stand in the way of its adoption. The necessary arrangements for the supply of water would become a legitimate charge upon the freeholder, as was the drainage of land, and no tenant would object to pay £1 per annum for the benefit of £5.

The Chairman observed, that the objection to the cost of the meters he thought of little moment, as £3 certainly would not go far towards furnishing a house with cisterns, which would be dispensed with by the introduction of the meter, and they would have the advantage of a constant supply of fresh water, whilst it now too often stagnated in the cisterns. He believed that they had very little to

complain of in the quality of the water supplied to them, and that if they obtained it constantly fresh it would be all they could require. He believed that one meter would be amply sufficient even for Buckingham Palace, whilst he could not conceive that one cistern would be of the slightest use in keeping that edifice supplied with water, and therefore there must be a great saving between the first cost of meters and cisterns. In conclusion, he begged to propose a vote of thanks to Messrs. Glynn and Fothergill for their very valuable papers, which, by the discussion they had elicited, he felt convinced must prove of great benefit to the public.

The SECRETARY announced that as Wednesday next, the 26th instant, had been appointed as a day of Public Humiliation and Fast, there would be no meeting of the Society on that day.

ON SCHOOLS OF INDUSTRY IN INDIA, AND THE USES TO BE SUBSERVED BY THEM, IN PROMOTING MORALS, AND IMPROVING THE PRODUCTIVENESS OF THE COUNTRY.

By DR. BUIST, F.R.S.

In my paper on the development of the resources of India I had occasion slightly to allude to the existence of schools of industry in the country, and the important ends they may be made to serve, if sufficiently multiplied, in diminishing the amount of crime and in promoting the prosperity of the people. The functions capable of being performed by such establishments in England afford us no idea whatever of the tasks they are competent to accomplish in India. Throughout Europe all trades are learned through the instrumentality of apprenticeships; a lad of fifteen who expects to employ thirty-five years of his life in some handicraft, finds, that by expending five years in apprenticeship, and thirty years in the profitable practice of his profession, he can turn out a larger amount of available work, and realise more money, than if he had omitted the apprenticeship and begun at once by attempting to do something that would yield him requital however trifling, but deprive him of the power of ever becoming really proficient in his trade. In India no one ever thinks of an apprenticeship; marriage takes place before the period of boyhood is past, and the family requires to be provided for at the age at which in England a lad would be learning his trade; and the whole life of a native tradesman becomes thus one of expedients and makeshifts. With the most incorrect eye imaginable it is next to impossible to make him use a square, a level, a plumb-line, or a rule. The carving of our Bombay furniture can hardly be surpassed in elegance, but its joinery is as execrable as its carving is excellent. Not a mortice is properly cleaned out or sufficiently filled, not a tenon is true or square; the surfaces of the most beautiful of our blackwood tables undulate like the waves of the sea; yet the time taken to execute work of this sort, with an everlasting correction of errors,—a perpetual chipping, scraping, and chiselling,—is at least three times that which would be required by an intelligent English workman, or a native who had served an apprenticeship, and begun methodically by planning and calculating everything, and by laying it off by compass, square, and rule. The same mischief obtains everywhere, and it is a matter of constant complaint at all our seminaries, that it is next to impossible to retain boys at school till they have become anything like decently instructed after they have obtained just such a smattering of English, reading, and writing, as will enable them to perform the humblest and worst paid varieties of clerk-work. We have no means of forcibly extinguishing mischiefs of this sort, or of putting them down, in any other way than by showing their folly, and this we can do by demonstrating by practice the soundness of the European principle, by exhibiting the superior proficiency of thoroughly taught apprenticed workmen, whenever we can secure the means of compelling apprentices —a thing we always can do with orphans and destitute children,—who must accept an apprenticeship as an equivalent for subsistence,—and with juvenile delinquents, who prefer a School of Industry to the House of Correction, the only alternative that is left them. It is almost impossible to conceive the waste of material that occurs everywhere in India in the construction of dwelling-houses and other buildings. Joists and beams of all descriptions are cut out square; trussing of roofs and diagonal bracings are only attempted when European models are imitated; and everything proves the slavery of custom, and exhibits a people who, however neat-handed, are devoid of all instruction, ignorant of the first principles of physics, afraid of innovation, and always endeavouring to copy some standard or established model, without reflection on its applicability to the case immediately in view.

In England the best taught pupils of a School of Industry, where paupers and criminals alone are instructed, must, in nine cases out of ten, turn out very inferior workmen to those who have learned by the ordinary method of apprenticeship, in most cases, under the paternal eye, or with every anxiety to learn, knowing that their success in the world depends on their proficiency. In India precisely the reverse of this is the case; and were Schools of Industry general, the best workmen would be their apprentices, and the apprenticing system would come in fashion when its benefits were perceived. In England, where the market is already filled to overflowing with the fruits of honest industry, an apprehension is at all times experienced of injuring a respectable tradesman who supports, as he has always supported his family, by his own unaided exertions, by bringing the work of the reformed rogue and the man, at all events in part, supported by the public purse, into the field against him. In India, again, while we have a profusion of animal effort, of mere thews and sinews at command, there is a prodigious deficiency of anything like skilled labour or tradesmanship amongst us; and Schools of Industry might on these grounds be made everywhere self-supporting. The pupils they turned out, as being the most proficient, would always be assured of finding the best paid employment in the country, while they could be made instrumental in introducing a variety of improved industry, such as under the present system young men will not, and old men cannot, learn. In England, engineers, architects, or builders, and our great capitalist contractors themselves, all thoroughly understand every portion of the work with which they are connected; in all likelihood they had been trained in some of the trades on which they draw, and are intimate with the principles as well as the details of all. In India all is the reverse of this; no man has the slightest acquaintance with the craft practised by his brother, or the least knowledge of their general principles. Contractors are occasionally mere adventurers, who contract for work with no part of which they have the slightest acquaintance, and let portions of it off to sub-contractors as ignorant as themselves. It has long been matter of complaint amongst the more intelligent portion of the natives that, while manual labour is deemed degrading, and skilled work, with the single exception of ship-carpentery, such as might furnish the means of advancement to a man with a moderate capital at his command, is a thing unknown; and that the bulk of those young men who have been left a tolerable competency by their parents, instead of occupying themselves or improving their means by honourable exertion, as in England, invest their money in stock, or lend it out at usury, to spend their lives in idleness, ignorance, and indulgence. The only trade pursued or known by those averse to the ordinary handicrafts now existing is that of purvoe or clerk, and this comes to be fearfully overstocked. It is these unhappy arrangements that in India keep the different classes of the community so hopelessly separated from each other, and which, together with the poverty and almost universal indebtedness of the really indus-

trious classes, renders it so difficult to introduce improved varieties of industry, to which, wherever shown their advantages, the natives have always been sufficiently alive; and it would be in exhibiting these that one portion of the value of Schools of Industry would lie. These remarks are somewhat general; perhaps, to a certain extent, they may seem obscure; they will, I trust, presently appear plain enough when I have given a short account of our schools of industry as at present existing, to which they refer; after which I shall be enabled more directly to point out the manner in which such establishments might be multiplied and extended, and the amount and nature of the services to the common wealth they are calculated to perform.

The School of Industry at Jubhulpore is the oldest establishment of this description in India, and is, perhaps, the most remarkable reformatory school in the world. Its original inmates were all murderers. Some individuals amongst them had sent some half-dozens of human beings out of the world; and the accumulated body had probably an amount of slaughter to answer for equal, at least, to that of Waterloo. Not only have they been thoroughly reclaimed from these practices, but a body of men, before the pests and disgraces of society, have become instrumental in establishing a colony of model workmen, who, but for the school, would have followed the miscreant footsteps of their fathers, and of introducing some of the most beautiful of our European manufactures into Northern India. The Thugs, the parties to whom we have been all along alluding, constitute one of the most singular classes of robbers and murderers in the world. They are represented on the frescos of the caves of Central India, believed to be at least two thousand years old, practising their atrocious trade exactly as it is now practised. They belong to no particular class or creed; the Mahomedan and Hindoo races alike contribute to them. They first became known to us some sixty or seventy years ago. They were scattered over the country in thousands and tens of thousands. Every form of disguise was familiar to them, by which the wary might be entrapped or waylaid. They appeared by the wayside as mendicants, or men suffering from disease, as guides, travellers, merchants, or pilgrims; they joined the traveller on his journey, offering him their companionship or assistance or seeking his company or protection, and, when the convenient moment arrived, they murdered and robbed him. Death was invariably produced by strangulation, and so skilful were they in concealing the bodies of their victims, and in eluding and escaping detection, that the crime was rarely discovered until its perpetrators had quitted the district, and got beyond the reach of justice.

So far from looking at their occupations as infamous or criminal, the Thugs boasted themselves as being the recognised means by which the distribution of property was equalised, and a check imposed on population. They were quite ready to argue the question. They pointed to the extreme antiquity of their profession, and the enormous extent to which it was practised, and said that, as God had created lions, tigers, and other ravenous beasts, so he had ordained the Thugs to assist in the abbreviation of human life. It was answered them that all this might be very true, but according to our notions, God had ordained civilised men, to exterminate the destroyers of mankind; and that if the Thugs in the pursuit of their vocation were hunted down and slain like wild beasts, to whom they compared themselves, they could have no reason to complain. When, however, we once fairly set ourselves to the performance of our task, the multitude of these miscreants who fell into our hands was too great for the hangman. Our difficulty lay mainly with the informers or approvers, as they were called, who had secured themselves pardon by bringing about the detection or conviction of their confederates, but who, having been trained to no trades but those of robbery and murder, of whose services, even had they been able and willing to labour, no man would accept, and whose presence was an abomination everywhere, and who must either be permitted to return to their former occupations or suffered to starve. It was wisely resolved, mainly on their account, to establish a colony at Jubhulpore for these men and their familes, where the criminals themselves should be kept under such restraint as to render escape hopeless; where they should be provided with food and compelled to labour, and the rearing of their families in honest courses be seen to. The foundation of the establishment was laid by Colonel Sleeman and Capt. Brown, and their good fortune in securing the services of Mr. Williams, the superintendent, on whom everything depended, has been the great secret of its success. Commencing with the simplest sorts of manufactures, such as were practised in the neighbourhood, for which a market could always be found, and where raw material was at command, they soon perfected themselves in weaving in cotton and wool, and afterwards in carpet-making. They became proficients in dyeing and printing, and commenced a large manufactory of tents, which now find abundant sale in all parts of India. Along with these things they have betaken themselves to carpetry, blacksmith and brass work in all departments, turning out in each such superior kinds of work, and at such moderate prices, as everywhere secures sales. By 1850, such had become their proficiency in rug and carpet making, so far as these arts could be acquired in India, that they obtained workmen from England to instruct them in the manufacture of Kidderminster and Brussels carpets. In the lapse of twenty years a vast number of those forming the original components of the school had passed away; those who remained behind had become so thoroughly reclaimed and civilised, that none would have dreamt that in the quiet, ordinary, industrious, middle-aged, or elderly men who constitute the seniors of the factory, he saw *those who* had spent the springtime and prime of life as professional murderers and robbers, and who had only escaped the gallows which they had deserved, by bringing others within the reach of justice. Their families, meanwhile, had grown up from childhood and youth to maturity. Thoroughly well educated in the elements, and trained in the respective trades and handicrafts, they not only formed a body of artisans superior in industry and skill to any to be met with in India, but some dozen or two of them were, in 1852, sent out to establish factories at the principal towns in the north-west provinces, and provide at the spot supplies of goods, which hitherto could only be procured at the parent establishment, and the cost of which was sometimes nearly doubled by requiring to be carried many hundreds of miles on the backs of bullocks or of camels in a country utterly destitute of so much as the vestige of a road. The Jubhulpore School of Industry, one of the most singular and meritorious establishments of the kind in the world, affords an excellent illustration of what may be done in India in the way of improving the handicrafts and skilled industry of the country by institutions originally established for purely reformatory purposes. The *Friend of India*, one of the last papers likely to be censorious on Government, mentions it as one of the most extraordinary incidents of the love of mystery-making and concealment which even the annals of oriental mystery-mongering contain, that the utmost care seems to have been taken by Government to keep back all information regarding that which it ought to have been their pride to make as notable as possible. Some remarks having a few years since appeared in the *Bombay Times* on the wretchedness of the requital received by Mr. Williams, to whom the prosperity of the establishment was mainly due, that gentleman was understood to have been threatened and severely censured as the supposed author of some of the notices of the establishments under his charge. (a)

(a) The following list of the descriptions of the Schools of Industry in England and India may assist those who are desirous of further enlightenment on the subject:—

School of Industry at Bombay.—In my paper on the Resources of India, (a) I have noticed generally the establishment of the Bombay Polytechnic Institute, of which the School of Industry was meant to have formed a part. An explanation of the delays which kept it back from 1847 to 1850 will be found in the "Annals of India," and need not here be further enlarged upon; they furnish illustrations of that fearful procrastination and endless waste of time which, unknown throughout the rest of the world, are in India (where it is most to be deprecated) the grand source of the retardation of progress, and prevention of improvement. In the year just named the Court of Directors granted the services of a second-class engineer from the Indian navy to superintend the school, on the condition that he should return to his duty the moment the navy required him; his emoluments were to be continued to him unimpaired, Government contributing this much to a reformatory establishment brought into existence purely for the public good by the contributions of the benevolent. In 1846 the draft of an Act was brought before the legislative council of India, authorising the managers of orphan schools to act as parents to those under their charge, and to indenture them, with their own consent, to parties willing to accept their services as apprentices. Magistrates of police were vested with like authority in reference to the juvenile delinquents that were brought before them. The original promoters of the scheme had, at the outset, cast about them for a site and piece of ground near the sea-shore sufficiently supplied with fresh water, ample enough to provide room for a brick-field and wood-yard for workshops, schools, and dormitories, and, ultimately, for places of residence for those who had completed their apprenticeship, and might feel disposed to continue as workmen at the school. The place fixed upon, six miles up the harbour from the fort, and about three from the nearest suburb of the town, was so selected as, besides fulfilling the other conditions, was sufficiently remote from the more populous portions of the island to secure the safety of the boys, who were in reality neither prisoners nor freemen. It was deemed essential to get rid, as far as possible, of the idea that the school was either a place of punishment or of restraint beyond what the simple interests of discipline required; but it was not to be forgotten, at the same time, while this was impressed upon the boys, that we had no magic amongst us to transform their habits or dispositions at once; that we had no reason to imagine that they became penitents, or saw the errors of their ways on being indentured; or that, for many a day to come, they would not greatly prefer returning to their former manner of life, unless prevented by fear of the police. Although our great object was to provide a place of refuge or reformation for the two hundred boys picked up annually by the police, betwixt the ages of ten and sixteen; we were anxious to admit all orphan or pauper children without making a criminal trial an essential preliminary, so soon as our funds permitted. On the boys being apprenticed to us, an indenture was formally drawn up betwixt the magistrate of police, and myself as head of the establishment, a copy of this remaining with me, another being lodged at the police office; the term of apprenticeship varying from three to five years. The apprentices, on being received, were washed and provided with such an amount of clothing and bedding as is customary in their rank of life—the requisites in these matters being moderate enough in all conscience; we next measured and weighed them, and made a note of all the circumstances we could learn as to their health, habits, birth, parentage, caste, country, and previous occupations. They were then permitted to select any trade they might prefer, being in most cases, however, placed for some weeks in the brick-field to mix or carry clay, lift water, or perform any variety of light slopwork, with a view of inuring them to habits of industry, method, and punctuality, without much regard to their learning at first any handicraft whatever; the time for this came by and bye. The whole of their previous lives had been spent in such utter disregard of time, and in such unspeakable idleness and irregularity, that there was a vast deal of what was mischievous to be unlearned before anything profitable could be taught. Having surmounted the difficulties at the outset, and got some fifteen or twenty boys steadily employed in useful work so as to furnish examples to new-comers, those who came afterwards, after being a few weeks or months at the School, soon learnt to select for themselves the occupation prescribed by their caste, and found most congenial to their dispositions. The professions taught were weaving of coir mats and carpets, of common cotton cloth, of twills, towelling and damask partly by the native partly by the English loom, the latter being an entire innovation; carpeting, cabinet work, coach making and turning in all their simpler forms, blacksmith work, both forging, fileing and finishing, brass work, the ordinary forms of tailoring, with brick making, and the coarser kinds of pottery manufacture. European methods of working being, as far as possible, engrafted upon the native, and European tools made use of when found expedient. A few of the boys who exhibited a taste that way received instructions in drawing, and they were all taught the simple kinds of gardening and agriculture on a small scale as practised around, in gardens provided for them, and of which the produce was exclusively their own. A good native schoolmaster was procured, who gave instructions, both in English and the vernaculars, in reading, writing, and arithmetic. The apartment used as a schoolroom by day serving as a reading and play room in the evenings and mornings, being supplied with sufficient store of pictures, maps, and books, such as were deemed suitable for the attainments of the pupils. The boys rise at daybreak, or between five and six o'clock; the morning is spent in their gardens, they then bathe and dress and cook their meals; exactly at nine the workshops are opened, when the muster roll is called over, after which the boy who acts as foreman in each department sets his pupils to work. We have, usually, from five to ten, sometimes as many as twenty, regularly-bred tradesmen in our employment, the number depending on the state of our funds and the demand for work. We find this the only way of making the apprentices proficient, or of turning out work not superior in price or inferior in quality to that to be found in the bazaar—our difficulty being to act on the apathy with which India is afflicted, and induce householders requiring the articles we produce to give us a preference of their custom. When I left Bombay in June last there were seventy boys under my charge, the majority of these were Mahomedans, nearly all the rest Hindoos; we had never more than two or three Parsees or Portuguese amongst them. Eight or ten, including two much the finest boys of the school, were volunteers, quite fit to support themselves in the second year of their apprenticeship; about a dozen of them expressed the utmost anxiety to come home with me; they had made great proficiency under our charge, and would, I am satisfied, in England have learned as rapidly and regularly as any boys of their age could have done. On one occasion a boy was sent a week's journey into the interior in charge of a fly-shuttle loom, to teach the inmates of a gaol the use of that implement, and having performed and fulfilled his task most faithfully, he returned to us of his own accord, when he might have got away had he thought fit. One of the cleverest apprentices we ever had was so mischievous and incorrigible that we were com-

Jubbulpore. *Chambers's Edinburgh Journal*, Nov. 1847, page 232.; *Friend of India*, January 30, 1851.
Bombay, Inauguration of. *Bombay Times*, June, 1850; ibid., January 26, 1851.
Ragged Schools in England. Dr. Guthrie's Plea for, (pamphlet, 1846); *London Quarterly Review*, 1846-47, vol. 79; *North British Review*, vol. 10, 1849; *Edinburgh Review*, vol. 85, page 580.

(a) See *Journal of the Society of Arts*, March 23, 1854.

pelled to cancel his indentures and have him sent to gaol. Six months afterwards we were surprised to receive a visit from him, accompanied by a number of respectable looking companions of his own age, who, he told us, had been brought to see the school to which he was under so many obligations. He said that on being released from gaol he had betaken himself to his own trade of thieving, but he now saw that this was a wretched and unprofitable profession, practised only by those who knew no better. He got put into gaol, whipped, and starved; he was, when at large, in constant fear of the police; three-fourths of what he stole went to his companions or the receivers, and he could scarcely make more than food and clothing of it at the most. The trade that we had taught him, that of carpenter, was in reality less laborious and more lucrative, so he offered himself as a journeyman in the dockyard, where he was employed when he made his visit to us, convinced by experience of the soundness of the maxim, that "honesty was the best policy."

I trust that as our establishment increases in size, and our resources improve, especially if the endowment of Sir Jamsetjee* becomes located in our neighbourhood, the general plan of the Polytechnic Institute will be restored in its integrity. So far from there being any aversion on the part of the native tradesman to employ better tools than those now at his command, or resort to improved modes of industry, he is quite as much alive as his English fellow-workmen to the desirableness of anything that will improve profits or economise labour; but, then, he has little invention, scarcely any reliance on himself, and no faith whatever in what he is told. With him, seeing alone is believing; but then no man is more easily satisfied of the suitableness of anything, or more ready to resort to it after he has seen its advantages, and the fact is well illustrated by the rapidity with which cart wheels of the English form have been substituted for those of the native shape all over Western India within the past thirty years. So soon as the natives saw the value of steamboats, they formed Joint-Stock Steam Navigation Companies amongst themselves, and there are now nearly twenty steamers plying from the port of Bombay almost all the private property of natives, and all brought into existence within the past twelve years. The railway was resorted to by them with the utmost eagerness the moment it was opened, and they exhibited the utmost docility in the construction of those parts of the work on which they were engaged. From their extreme poverty, and the small amount of money they are disposed to pay for tools, those only of the cheapest and poorest description are sent out from England for sale in India, and an English workman would prefer the rude, simple, inefficient, but strongly formed tools of the native, to those of the shapes to which he had been accustomed, were no better within his reach than the rubbish the bazaar supplies. When the workmen from Rajpootanah, Googerat, and Kotah, referred to in my former paper, were with me, I obtained first-rate English tools, partly from the Railway Company, partly from the Government stores, and found them infinitely preferred by them to those with which they were familiar; and it was a part of our plan to have a supply of first-rate English implements always beside us, to be disposed of at wholesale prices to those who had been trained to use them.

The disappointments that have arisen from the failures so often complained of in this species of innovation, have been occasioned mainly by want of attention to the peculiarities of the climate of the country, and constitution and habits of the natives. In warm latitudes everyone resorts to a sitting or recumbent posture as often as possible, and the peculiarity Mrs. Trollope ascribes to the Americans of sticking their feet on the tops of tables, and throwing their legs over the backs of chairs, may be found exhibited in any mess-room by gentlemen disposed to take their ease where ladies are absent. The dryness of the climate permits this tendency to be indulged in without inconvenience, and a workman squatting on the ground under a tree, with his work-stools around him, finds himself much more in his element than he would be, confined in a workshop and provided with a bench. A native becomes so much accustomed to use his feet when we employ our hands that he is virtually quadruminous; his toes are to him almost as useful as his fingers, and it is just as absurd to endeavour to deprive him of the benefit of these as it would be to try to persuade an English workman to dispense with the use of his right hand because he might be taught to manage well enough with his left. Limited, however, by such considerations as these, there is still abundant room left for innovation and improvement, to which the demand for skilled labour on our railways, and other varieties of work promising to be brought into existence by European enterprise, will afford an abundant stimulant. A school of industry, comprising all the leading objects here set forth, once well organised at the Presidency, will form the model and the germ for numbers of other schools in the district, such as have emanated from Jubhulpore, each spreading around it improvements of all descriptions in every department of industry in the district in which it was located. Dr. Royle, the other evening, referred to the improved varieties of wheat introduced by Mr. Williams at Jubhulpore; and the annexation of a considerable farm to the school, where circumstances permit it, might be the source at once of excellent occupation for the pupils, of great improvement in agriculture, and of making the produce desired at home become familiar to purchasers. At stations of European regiments instruction might be obtained with advantage from soldiers who had been tradesmen before enlistment, and the unspeakable benefit conferred on the army, of having some portion of that idleness disposed of which is at present the parent of such countless mischiefs could scarcely be estimated.

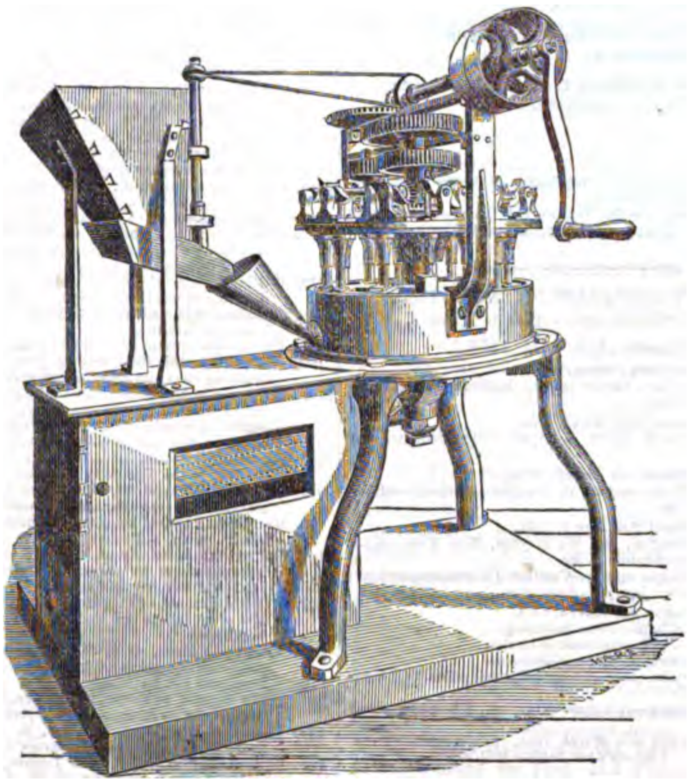
Schools of Industry in India could be best brought into existence and kept in operation by the joint efforts of Government and the community. Natives always keenly on the watch to see what meets with favour from the authorities, are in general ready to favour any philanthropic enterprise Government countenances, but are to turn their backs on whatever Government looks on with coldness—and coldly enough it has, for the most part, looked on these things heretofore. The School of Industry at Bombay would at one time have fallen to the ground, but for the cordial assistance and munificent subscriptions of the Chief Justice (Sir Erskine Perry), who was its chairman, the Chief Magistrate of Police (Mr. Spens), and the Secretary to the Government in the Judicial Department (Mr. J. G. Lumsden, now member of council); and the kindly and cordial interest these philanthropic men took in the welfare of their pupils was scarcely less important than the pecuniary contributions they made to the school. The uneducated part of the natives can never realise the idea of a judge being bound by rules, and merely administering the law. They look upon him as the independent and self controlling fountain of justice, of rigour, or of mercy; and when those who, as they supposed, might have inflicted on them stripes or banishment, consigned them to prison or to death, came amongst them as their parents, protectors, and instructors, a feeling of affection and reverence was excited amongst them, such as can only be imagined by those who witnessed it, and considered the circumstances out of which it arose. The whole of our discipline was based on the principles of parental affection, and nothing was so effective for the ends of reformation as to show the boys that they were no longer desolate, no more to suppose themselves outcasts, wanderers, or vagabonds upon the earth; that there were those who cared for them, and wished only for their welfare, and whom it behoved them not to offend.

Having lost no opportunity of visiting the reformatory

* See Journal of Society of Arts, March 23.

schools wherever I have been since my return to England, it has occurred to me that on several points the arrangements of that of which I have charge surpassed those of most that I have seen; and our mode of registration was considered so superior in most places, that viewing reformatory schools as from henceforth a portion of the institutions of the country, I have sent a copy of it to the Secretary of State.

PULVERIZING MACHINE.



The machine represented in the above cut is for the purpose of pulverizing sugar, gum, and other substances which cannot easily be ground without clogging. The inventor, Mr. Chase, of Boston, Massachusetts, is a manufacturer of confectionary upon a large scale in the United States, and the above is one of a series of machines which he has invented for business purposes.

The machine consists in a novel and ingenious application of stampers affixed to a revolving plate attached to the central shaft, and acting within a circular chamber or mortar. Within this mortar is a circular dish, which occupies the centre space, and is furnished with projections or wings on its edge, which divide that part of the mortar nearest its outer edge into a number of rotative cells or chambers. In each of these cells one of the stampers is placed. When the machine is set in motion the stampers and dish are carried round together, and the former are alternately lifted and dropped by means of the gearing and cams placed around the centre shaft. Each stamper thus makes eighty beats during a single revolution of the shaft. The cells are fed by the hopper through the spout inserted into the side of the mortar, and, having made one revolution, are emptied, through another hole at the bottom of the mortar, into the bolting sieve placed in the chamber beneath the hopper.

There is one peculiarity in the action of the stampers in this machine which deserves notice. The sides of the cells in which the pounding takes place being constantly in motion, the material to be pounded is carried round by them, and pushed along or turned over upon the fixed plate which forms the bed of the mortar. By this action a fresh surface is constantly presented to the blow of the stamper, and the ingredients to be pounded never can get beaten into a hard, compact mass, as is often the case with fixed stampers, and thus a very large amount of their power is rendered ineffective.

The machine has just been provisionally protected by patent in this country.

POSTAL ANOMALIES.

If you want to send a periodical cheaply from Calcutta to Delhi, send it by London; it will be charged *eightpence* for the 8000 miles home, and as much for the same distance back; while for the 800 miles direct it will be charged two rupees, or *four shillings*. The land carriage from Calcutta is the same in both cases, only in the cheaper one the periodical has the advantage of 16,000 miles sea voyage.

To Correspondents.

ERRATA.—In Dr. Royle's paper, in last number, at page 370, column 1, line 37, for "He had also, &c., to Italian hemp," read "Cord 14 inches in length of Italian hemp, broke with 165 lbs.; Petersburgh, broke with 180 lbs.; and Rheea fibre cord with 325 lbs." Also in same page and column, in 3rd line of table, 5th column, for "30,488," read "20,488."

*** Owing to the length of the articles in this week's number, several letters and other matter stand over till next week.

MEETINGS FOR THE ENSUING WEEK.

MON. Antiquaries, 2.—Anniversary.
Actuaries, 7.—Mr. Holmes Ivory, "On the Value of Deferred and Reversionary Annuities."
Geographical, 8½.—Commander J. C. Prevost, R.N., "Official Report on the Isthmus of Darien."

TUES. Royal Institution, 3.—Prof. J. Tyndall, "On some Phenomena of Heat."
Meteorological, 7.
Syro-Egyptian, 7½.—Anniversary.
Civil Engineers, 8.—Discussion upon Mr. Clark's "Description of the 'Enterprise' with Ruthven's Propellor."
Medical and Chirurgical, 8½.
Zoological, 9.

THURS. Royal Institution, 3.—Mr. M. T. Masters, "On Botany."
London Institution, 7.—Anniversary.
Numismatic, 7.
Royal, 8½.

FRI. Philological, 8.
Royal Institution, 8½.—Prof. E. Forbes, "On the Manifestation of Polarity in the Distribution of Beings in Time."

SAT. Zoological, 1.—Anniversary.
Royal Institution, 3.—Dr. Whewell, "On the Influence of the History of Science upon Intellectual Education."
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April* 14*th*, 1854.]

Dated 24th February, 1854.

456. A. E. L. Bellford, 16, Castle street, Holborn—Turntables. (A communication.)

Dated 18*th March*, 1854.

649. P. M. Parsons, Duke street, Adelphi—Permanent way of railways.

Dated 20*th March*, 1854.

657. J. Horton, Shoreditch, and R. J. Polglase, Stepney—Ships' boilers, girders, &c.

Dated 27*th March*, 1854.

705. A. E. Forty, Kennington, and W. Haynes, New Kent road—Compositions for mouldings, &c.
707. A. Prince, 4, Trafalgar square—Candles. (A communication.)
709. J. A. Manning, Inner Temple—Sewerage.

Dated 28*th March*, 1854.

711. J. Hipkiss, Birmingham—Dress fastening.
713. H. A. Archereau, Paris—Galvanic batteries.
715. J. Roberts, M.D., Bruton street—Cabriolets.
717. W. Hahner, Leghorn—Muriatic and sulphuric acids. (A communication.)
719. W. Hahner, Leghorn—Alkaline sulphites. (A communication.)

Dated 29*th March*, 1854.

721. J. H. Johnson, 47, Lincoln's inn fields—Mill-work. (A communication.)
723. R. H. Causton, Battersea—Mill-bands.

Dated 30*th March*, 1854.

725. J. F. Lucevilliard, Dijon—Dress fastening.
726. W. Corrall, 11, Albert street, Mile end—Vehicles.
727. W. Johnson, 47, Lincoln's inn fields—Galvanic, electric, and magnetic apparatus. (A communication.)
728. W. Tucker, Old Brompton, and W. Adams, Kensington—Preventing smoke.
729. E. Townsend, Massachusetts, U.S.—Sewing machines. (A communication.)
730. H. Cowley, Oxford—Bricks.
731. J. Sandys, 72, Upper Whitecross street—Electric telegraph instruments.
732. T. R. Crampton, 15, Buckingham street, Strand—Crushing, &c., ores.
733. P. J. Passavant, and J. Cure, Bradford—Combing wool, &c.
734. W. Simpson, Birmingham—Railway signals.
735. H. Y. D. Scott, Queen's terrace, Woolwich—Cement.
736. E. C. Willis, Cambridge—Sheet gutta percha.
737. A. V. Newton, 66, Chancery lane—Hone. (A communication.)

Dated 1*st April*, 1854.

744. D. Forbes, Edinburgh—Reference for books.
746. J. Inshaw and J. Parker, Birmingham—Suppressing smoke and increasing draught.
750. A. V. Newton, 66, Chancery lane—Sewing machinery. (A communication.)
752. J. H. Johnson, 47, Lincoln's inn fields—Printing fabrics. (A communication.)
754. G. Brockelbank, Point Blackheath—Metals from ores.
756. G. F. Wilson, Belmont, Vauxhall—Dyeing turkey red.

APPLICATION WITH COMPLETE SPECIFICATION FILED.

828. H. Kemp, Creekmoor, Poole—Preparation of wood for planking.—8th April, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed April 13*th*, 1854.

2357. Sir John Scott Lillie, of 4, South street, Finsbury—Improvements in machinery for breaking stones and other hard substances.
2368. Mary Ann Davy, of Homerton, and Ann Taylor, of Islington—Improvements in the mechanical application of brushes.
2369. William Palmer, of Brighton—Improvements in ventilating.
2378. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in the manufacture of iron.
2379. Buckley Royle, and William MacEwan Chell, both of Manchester—Method of treating silk waste arising from winding, warping, and weaving silk, and rendering it capable of being spun or otherwise employed.
2384. Alexander McDougall, of Manchester—Improvements in the process of obtaining fatty matters from products arising in the manufacture of glue and other gelatinous substances.
2390. John Macmillan Dunlop, of Manchester—Improvements in machinery or apparatus for pressing goods; applicable also to raising or removing heavy bodies.
2419. William Binns, of Leeds—Improvements in the treatment or finishing of woollen and worsted fabrics.
2428. Jonathan Woofenden, of Belfast—Improvements in power-looms for weaving.
2528. James Chesterman, of Sheffield—Improvements in hardening and tempering steel, and in grinding, glazing, buffing, and brushing steel and other metallic articles.
2563. William Racster, of the Royal Military Academy, Woolwich—Improvements in the construction and arrangement of the buffing apparatus of railway carriages, and the mode of applying the buffer and draw-springs to such carriages.
2867. Frederick Osbourn, of Aldersgate street—Improvements applicable to the distribution of manure.
2900. Benjamin Fullwood, 23, Abbey street, Bermondsey—Improvements in the manufacture of cement.
70. Marcel Vetillart, of Le Mans—Improvements in drying woven fabrics, yarns, and other goods.
197. Sydney Smith, of Hyson Green Works, near Nottingham—Improvements in valves or apparatus for regulating the passage and supply of fluids.
206. William Palmer, of Brighton—Improvements in the manufacture of materials for and in constructing houses and other buildings.
253. Albert Robinson, of 9, Whitehall place—Improvements in preparing compositions for coating iron and other ships' bottoms, and other surfaces.
264. James Stevens, of Darlington Works, Southwark Bridge road—Improvements in apparatus for giving railway signals.
288. Thomas and William Hemsley, of Melbourne, Derby—Improvements in the manufacture of looped fabrics.
296. Edward Poitiers, of Malden terrace, Haverstock hill—New material for the manufacture of cordage, canvas, and linen, and generally as a substitute for hemp and flax.
301. Abraham Pope, of 81, Edgware road—Improvements in machinery for crushing, grinding, amalgamating, and washing quartz or matters containing gold.
327. Jacques Rives, of 8, Hotel Motay, Paris—Improvements in railways and railway carriages.
347. James Cox, of Wenlock road, City road—Improvements in knives for cutting paper and other materials.
350. John Greenwood, of Irwell Springs, near Bacup—Improvements in dyeing textile materials or fabrics.
390. William Morrison, of Bowling, Dumbarton—Improvements in railway wheels.

Sealed April 18*th*, 1854.

2399. George Louis Stocks, of Limehouse Hole—Improvements in ships' jack stays for masts, and gaffs for fore and aft sails.
2401. Alphonse Doste Noel, of Chancery lane—Improvements in the manufacture of zinc white. (A communication.)
2403. Cornelius Nicholson, of 3, New Broad street—Apparatus for avoiding collisions of trains on railways.
2558. James Scott, Shrewsbury—Improved apparatus for shifting carriages, waggons, engines, and other vehicles on railways and tramways.
55. The Reverend William Renwick Bowditch, of Wakefield—Improvements in economising fuel, and in the more economical production of light and heat.

Sealed April 19, 1854.

2410. William Roy, senior, of Cross Arthurlie, Renfrew—Improvements in printing textile fabrics and other surfaces.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854. April 13	3590	Improved Clod Crusher	Thomas Wm. Wedlake and Richard Dendy	Hornchurch, Essex.

Journal of the Society of Arts.

FRIDAY, APRIL 28, 1854.

EDUCATIONAL EXHIBITION.

The following names have been added to the Committee since the publication of the last Journal:—

Bennett, W. Sterndale, R.A. Mus.
Bowstead, Joseph, H.M. Inspector of Schools
Brookfield, Rev. W. H., M.A., H.M. Inspector of Schools
Brown, Rev. R. W., M.A., Ph. D., Prebendary of St. Paul's, Professor of Classical Literature in King's College, and Chaplain to H.M. Forces
Buist, George, M.D. (of Bombay)
Cazalet, Rev. W. W., R.A. Mus.
Chichester, the Bishop of
Eastlake, Sir Charles L., President of the Royal Academy
Ebrington, Viscount
Frankland, Prof. E., Owen's College, Manchester
Hill, Frederick
Hill, Rev. James, B.D., Head-Master of Royal Naval Upper School, Greenwich
Hullah, John
Ibbetson, Capt. Boscawen, F.R.S.
Latham, R. G., M.D., F.R.S.
Lindley, Professor
Linton, W.
Long, George, M.A.
Lumley, W. G., Poor Law Board
Lunn, H. C., R.A. Mus.
Mackenzie, Rev. H., M.A.
Major, Rev. J. R., D.D., Head Master King's College School
Menet, Rev. J. Hockerill Training School
Merivale, Herman, Colonial Office
Morel, J. D., H.M. Inspector of Schools
Nicholay, Rev. C. G., A.M., Deputy Chairman of Queen's College, London
Portlock, Lieut.-Col., R.E., Woolwich
Powell, Rev. Baden, M.A., F.R.S., Oxford
Smith, Rev. Philip, B.A., Head Master of Mill Hill School
Thomson, Rev. David, Sub-Principal of the University College, Aberdeen
Waley, Jacob
Willis, Professor, F.R.S.

The Council has appointed the following members of its body to be the sub-committee for finance:—

Mr. H. Cole, Mr. C. Wentworth Dilke, (V.P.), Mr. P. Graham (Auditor), Dr. Lyon Playfair, Mr. S. Redgrave (Treasurer), and Mr. Winkworth (Treasurer).

The Committee met on Friday last at five o'clock, and, after electing for its Chairman the Earl Granville, who has accepted the office, proceeded to name the members to serve on the sub-committees as follows:—

Sub-Committee for Correspondence:—Lord Berriedale, Lord Ebrington (chairman), Mr. Joseph Kay, Mr. F. R. Sandford, Mr. E. C. Tufnell, and Mr. Twining.

Sub-Committee for Classification, Arrangement, and Selection,.—Rev. J. Barlow, H. Cole, H. Chester, Rev. S. Clark, John Creesly, C. W. Dilke, H. Dunn, P. Graham Dean of Hereford, Edward Hughes, John Hullah, Rev. M. Mitchell, Rev. H. Moseley, Dr. Playfair, J. Reynolds, B. Scott, T. Twining, jun., Professor Willis (chairman), J. Waley.

Sub-Committee for Lectures.—Messrs. C. Babbage (chairman), Rev. J. Barlow, Sir G. Clerk, Bart., Dean of Hereford, R. Hunt, Dr. Latham, W. Linton, H. C. Lunn, Rev. H. Moseley, Professor R. Owen, Dr. Playfair, Rev Baden Powell, Rev. P. Smith, Professor John Wilson, R. N. Wornum.

The Sub-Committee for Finance has met twice. The Sub-Committee for Correspondence has met twice. The Sub-Committee for Classification, Arrangement, and Selection, met on Tuesday last, and determined to issue forthwith a Classified List of Objects for Exhibition. The Sub-Committee for Lectures has met once.

Mr. H. Chester, the Chairman of Council, is *ex officio* a member of all Committees and all Sub-Committees.

Mr. J. M. Dodd has been appointed General Superintendent of this Exhibition.

TRADE MUSEUM.

The following letter has been received from the Colonial Office, in reply to a communication from the Council of the Society of Arts:—

"Downing Street, 15th April, 1854.

"Sir,—In answer to your letter of the 3rd instant, I am directed by the Duke of Newcastle to request you will inform the Council of the Society of Arts that when the contemplated North Australian Exploring Expedition shall have been organised, his Grace will not fail to bear in mind the suggestion of the Society respecting the collection of specimens the produce of the districts about to be explored, and he will direct the officer who may be charged with the conduct of the Expedition to communicate with Professor Solly, in order that he may make arrangements for that purpose.

"I am, Sir,
"Your obedient Servant,
"FREDERICK PEEL."

FRENCH EXHIBITION OF 1855.

Board of Trade, Department of Science and Art, Marlborough House, Pall Mall, April 17, 1854.

The Right Honourable the Lords of the Committee of Privy Council for Trade and Plantations have received, through the Secretary of State for Foreign Affairs, a copy of the General Regulations for the Management of the Universal Exhibition at Paris, in 1855.

NAPOLEON,

By the Grace of God, and the national will, Emperor of the French.

To all whom it may concern, greeting:

Having considered the project proposed by the Imperial Commission for the regulation of the Universal Exhibition of Industrial and Agricultural Products and of the Fine Arts,

We have decreed and do decree, as follows:

The rules for the general regulation of the Universal Exbition, herewith annexed are approved.

Palace of the Tuileries, 6th April, 1854.

NAPOLEON.

By the Emperor:
Achille Fould, Minister of State.
P. Magne, Minister, Secretary of State for Agriculture, Commerce and Public Works.

GENERAL RULES.

Article I. The Universal Exhibition to be held at Paris, in the year 1855, will receive Agricultural and Industrial Products, and Works of Art, from all nations.

It will be opened on the 1st May, and will be closed on the 31st October of the same year.

Article II. The Exhibition of 1855 is placed under the direction of the Imperial Commission, nominated by the Decree of the 24th December, 1853.

Article III. In every department a Committee, nominated by the Prefet, in accordance with the instructions of the Imperial Commission, will be charged with the necessary measures for the success of the Exhibition, and with the rejection and selection, at proper times, of articles presented.

Local sub-committees, or special agents will also be established, should the Imperial Commission deem it necessary, in every town and centre of industry where the necessity may be felt.

Article IV. Special instructions will be addressed, in the name of the Imperial Commission, to the Ministers of War and Marine, for the exhibition of the products of Algiers and the French Colonies.

Article V. Foreign Governments are invited to appoint, for the selection, examination, and transmission of their national products, committees, whose formation and composition should be notified as soon as possible to the Imperial Commission, in order that the Imperial Commission may immediately place itself in communication with such committees.

Article VI. The departmental Committees, as well as Foreign Committees, authorised by their respective Governments, will correspond directly with the Imperial Commissioners, who will hold no correspondence whatever with single exhibitors, either French or foreign.

Article VII. Frenchmen or foreigners who propose exhibiting, must address themselves to the Committee of the department, colony, or country which they inhabit.

Foreigners, resident in France, may address the Official Committee of their respective countries.

Article VIII. No article will be admitted to the Exhibition which is not sent with the authorization and under the seal of the Departmental or Foreign Committees.

Article IX. Foreign and Departmental Committees should make known as soon as possible the probable number of exhibitors in their division and the space they consider they will require.

Article X. On receipt of this communication, the Imperial Commission, will, without delay, proceed to the division of the space, between France and the other countries, *pro rata* to the demands made.

Article XI. When this division is completed notification will immediately be sent to the foreign and French Committees, who will themselves have to subdivide the space thus allotted to them, amongst the exhibitors of their divisions.

Article XII. The List of Exhibitors admitted, must be sent to the Imperial Commission, by the latest, the 30th November, 1854.

These lists must indicate:

1. The names, christian names (or name of firm), profession, and residence, of intending exhibitors.
2. The nature and the number or quantity of the articles they wish to exhibit.
3. The space which they will occupy in height, breadth, and depth.

These lists, as well as any other documents, coming from foreign countries should, whenever possible, be accompanied by a translation in the French language.

Admission and Classification of Products.

Article XIII. All articles, the products of Agriculture, Industry, or Art, except those mentioned below, are admissable to the Universal Exhibition:

1. Living animals and plants.
2. Animal and vegetable substances in a fresh state, and susceptible of alteration.
3. Explosive substances, and generally those substances which are acknowledged as dangerous.
4. Those articles which, from their bulk, do not come within the scope of the Exhibition.

Article XIV. Spirit or alcohols, oils and essences, acids and corrosive salts, and generally those bodies easily inflammable, or which from their nature are likely to produce combustion, will only be admitted to the Exhibition when contained in strong vessels, perfectly closed; the proprietors of these products will in addition be bound to submit to any conditions of safety that may be prescribed to them.

Article XV. The Imperial Commission will have the right of excluding from the building, on the proposition of competent agents, such French products as may appear to them hurtful and incompatible with the objects of the Exhibition, and those which are in excess of the requirements or wants of the Exhibition.

Article XVI. The Exhibition will be divided into Two distinct Divisions—the Products of Industry and Works of Art; in every country they will be distributed into eight groups, comprising thirty classes, namely;

1st DIVISION.—PRODUCTS OF INDUSTRY.

1st Group.—Industrial Pursuits having for their principal object the Extraction or Production of Raw Materials.

1st Class.—Mining and Metallurgical products.
2nd Class.—The art of managing Forests, the produce of the Chase, Fishing, and products obtained without cultivation.
3rd Class.—Agriculture.

2nd Group.—Industry having for its special object the employment of Mechanical Powers.

4th Class.—Machinery in General, as applied to Industry.
5th Class.—Special Machinery and Apparatus for Railroads, and other modes of transport.
6th Class.—Special Machinery and Apparatus for Workshops.
7th Class.—Special Machinery and Apparatus for the Manufacture of Woven Fabrics.

3rd Group.—Manufactures, specially based on the employment of Physical and Chemical Agents, or relating to the Sciences and to Instruction.

8th Class.—Exact Sciences. Industry applied to the Sciences and to Instruction.
9th Class.—Manufactures relating to the economical production and employment of Heat, Light, and Electricity.
10th Class.—Chemical Manufactures, Dyeing and Printing Paper, Leather, India-rubber, &c.
11th Class.—Preparation and preservation of substances used as Food.

4th Group.—Industry specially relating to Learned Professions.

12th Class.—Hygiene, Pharmacy, Medicine, and Surgery.
13th Class.—Naval and Military Art.
14th Class.—Civil Engineering and Building.

5th Group.—Manufactures of Mineral Products.

15th Class.—Steel and its Products.
16th Class.—General Metal works.
17th Class.—Goldsmiths' Work, Jewellery, and Bronzes.
18th Class.—Glass and Pottery.

6th Group.—Woven Fabrics.

19th Class.—Cotton Manufactures.
20th Class.—Wool Manufactures.
21st Class.—Silk Manufactures.
22nd Class.—Flax and Hemp Manufactures.
23rd Class.—Hosiery, Hats and Caps, Carpets, Gold and Silver Lace Fringes, Embroidery, Lace, &c.

7th Group.—Furniture and Decoration, Fashions, Industrial Design, Printing, Music.

24th Class.—Industry applied to Furniture and Decoration.
25th Class.—Articles of Clothing, Objects of Fashion and Fancy.
26th Class.—Drawing and Modelling applied to Industry. Letter-press and Copper-plate Printing, Photography.
27th Class.—Manufacture of Musical Instruments.

2nd DIVISION.—WORKS OF ART.

8th Group.—Fine Arts.

28th Class.—Painting, Engraving, and Lithography.

29th Class.—Sculpture and Die-sinking.
30th Class.—Architecture.

RECEPTION AND PLACING OF GOODS.

Article XVII. Goods, both foreign and French, will be received at the Exhibition Building from the 15th January to the 15th March, 1855, inclusive.

Nevertheless, in the case of manufactured articles which are likely to suffer from being kept too long packed, a supplemental delay will be allowed, which, however, in no case must extend beyond the 15th April, on the condition that every arrangement necessary for their proper display and exhibition is prepared beforehand.

All heavy and cumbersome objects, and any others which require much labour for their fixing, must be sent before the end of February.

Article XVIII. The Committees of each country and of each French department are requested, whenever possible, to send in one consignment the products of their divisions.

Article XIX. The consignment of each exhibitor, whether sent with that of other exhibitors or alone, must be accompanied by the bulletin of admission, delivered by the competent authority. This bulletin in triplicate, drawn up in the form prescribed in Article XII., will bear in addition, the number and weight of the different packages belonging to the same exhibitor, as well as the particulars and price of every article composing the consignment.

A copy of the form in which this bulletin is to be made out will be sent to every French and foreign Committee.

Article XX. French products destined for the Universal Exhibition will be forwarded from places pointed out by the Departmental and Colonial Committees, and taken back to the same places, at the expense of the State.

Foreign products, having the same destination, will be equally brought to Paris, but only from the French frontier, and will be sent back under the same conditions.

Article XXI. The packages must be addressed to the Commissioner for classifying in the Exhibition building.

Article XXII. The address of each package destined for the Exhibition must bear in legible characters—

The place from which it is sent.
The name of the exhibitor.
The nature of the contents.

FORM OF ADDRESS.

A Monsieur le Commissaire du Classement de l'Exposition Universelle.

Au Palais de l'Exposition.—Paris.

Consignment of [name and christian names of exhibitor or firm], residing at [residence or situation of establishment], exhibitor of [nature of product exhibited].

Article XXIII. Packages containing the products of several exhibitors must bear on them the names of each exhibitor, and be accompanied by a separate bulletin of admission for each of them.

Article XXIV. Exhibitors are invited not to send separately packages of less dimensions than half mètre cube, and to place in the same packing-case with other packages of the same class those which come within these dimensions.

Article XXV. The admission of products to the Exhibition will be gratuitous.

Article XXVI. Exhibitors will not be subject to any kind of payment, either for space or entrance, or on any other pretence whatever, during the time of the Exhibition.

Article XXVII. The Imperial Commission will provide for the custody, placing, and arrangement of products in the interior of the Exhibition building, also for the necessary works for setting machinery in motion.

Article XXVIII. Tables and counters, floors, enclosures, barriers, and partitions between the different classes of productions will be furnished gratuitously to exhibitors.

Article XXIX. All detailed arrangements, such as steps, shelves, supports, suspenders, glass cases, hangings, awnings, paintings, and ornaments, will be at the charge of the exhibitors.

Article XXX. No arrangements, dispositions, or ornamentations will be allowed to be executed which do not conform to the general plan, and must be executed under the surveillance of inspectors, who will determine on the height, form, and projections of counters, as well as on the colour of the painting, hangings, and draperies.

Article XXXI. Decorators recommended or approved by the Imperial Commission, will be at the service of the exhibitors, and their charges will be regulated by the agents appointed for that purpose, if the exhibitor desire it.

Nevertheless exhibitors are at liberty to employ, with the authority of the Commission, such workmen as they may themselves choose.

Article XXXII. Exhibitors who may wish to exhibit machines or other objects of an extraordinary weight or size, and which will require foundations or particular constructions, must make a declaration to that effect on their demand for space.

Article XXXIII. Those likewise who exhibit machines requiring steam power, fountains or hydraulic engines, must state their intention in proper time, and name the quantity and pressure of water or steam which will be necessary for them.

Article XXXIV. All products will be arranged together by nations, in the order of classification indicated by Article XVI.; nevertheless the different products of one individual, of one corporation, town, department or colony can, if there is space enough, be exhibited in particular groups, when such dispositions do not essentially interfere with the established order.

Article XXXV. The Imperial Commission will take every necessary precaution to preserve objects exhibited from every chance of damage; but if, notwithstanding the precautions taken, an accident should happen, the Commission will not be responsible for the damage that may result. These risks exhibitors must take on themselves, as also the expense of insurance, if they judge this precaution necessary.

Article XXXVI. The Imperial Commission will also provide a numerous and active staff for watching the objects exhibited; but they will not be responsible for any thefts or frauds that may be committed.

Article XXXVII. Every exhibitor will be allowed to employ an agent to watch his own goods. Notice must be given before the opening of the Exhibition, of the name and station of this agent; he will have a ticket of admission delivered him, which he will not be allowed either to transfer or lend during the period of the Exhibition, on pain of forfeiture.

Article XXXVIII. Agents of Exhibitors must confine themselves to answering any questions that may be addressed to them, and to giving cards of address, prospectuses, or price lists, when asked for.

They will be forbidden, on pain of expulsion, from soliciting the attention of visitors, or from inviting them to buy objects exhibited.

Article XXXIX. The selling price of any article exhibited may be prominently affixed to it.

Any exhibitor desirous of doing so, must previously make a declaration before his Committee, either local, French, or foreign, who will certify the price, after testing its verity.

The price thus affixed will, in case of a sale, be obligatory on the Exhibitor, as regards the buyer.

In any case where the declaration of price shall be proved false by the Imperial Commission, they will have the power of turning the article out of the Exhibition, and excluding the exhibitor from exhibiting.

Article XL. Articles sold cannot be removed until the close of the Exhibition.

Foreign Products.

Customs.

Article XLI. As regards foreign products admitted to the Exhibition, the Exhibition Building will be considered as a bonded warehouse.

Article XLII. These products, accompanied by the Bulletins mentioned in Article 19, will enter France by the ports and frontier towns undermentioned:—

Lille, Valenciennes, Forbach, Wissembourg, Strasbourg, Saint Louis, Les Verrières-de-Joux, Pont-de-Beauvoisin, Chapareillan, Saint Laurent-du-Var, Marseille, Cette, Port-Vendres, Perpignan, Bayonne, Bourdeaux, Nantes, Le Havre, Boulogne, Calais, and Dunkirk.

Article XLIII. The consignments may be addressed to agents named by the Imperial Commission in each of these ports or towns; these agents will, for a certain tariff previously arranged, undertake all the necessary formalities regarding customs, and forward the goods to the Exhibition building.

Article XLIV. Foreign products thus entering France will be received at the Exhibition building, where they will then be taken charge of by Custom-house officers.

Article XLV. The packages can only be unpacked in the interior of the building, in presence of the Exhibitors or their representatives, and under the care of the Custom-house officers.

Article XLVI. One copy of the Bulletin of contents, which will be considered as the original certificate, will remain in the hands of the Customs, another will be given to the Commissioners for classifying the Exhibition, and the third to the Secretary-General of the Imperial Commission.

Article XLVII. Foreign Exhibitors or their agents will have to declare, after the closing of the Exhibition, whether their goods are intended for re-exportation or for interior consumption.

In this latter case they can immediately dispose of them by paying the duty, in determining the amount of which the administration of Customs will take into account the depreciation that may result from their having been exposed for exhibition.

Article XLVIII. Articles hitherto prohibited will, as an exceptional case, be admitted for interior consumption, on paying a duty of twenty per cent. on their actual value. This duty is the maximum that will be demanded on any article destined for exhibition.

Interior Organization and Police Arrangements.

Article XLIX. The interior organization and police of the Exhibition will be placed under the authority of an Executive Committee, composed of different Heads of Department, who will determine all questions under their jurisdiction.

Article L. A notice, which will be published before the time fixed for the reception of goods, will be posted in the building, and will determine all points relative to the interior regulations, and will also name the persons charged to aid exhibitors, and to take care of the order and security of the Exhibition.

Article LI. Agents and officers attached to the Foreign Division of the Exhibition will speak the language of one or several of the nations to which they may be attached.

Interpreters officially recognised by the Imperial Commission will besides be established in different parts of the foreign division.

Article LII. Foreign Governments are requested to accredit to the Imperial Commission, *Special Commissioners*, charged to represent their countries at the Exhibition during the operations of reception, classifying, and placing the goods, as well as under any other circumstances where their interests are in question.

Protection of Designs and Inventions.

Article LIII. Every exhibitor, the inventor or legal proprietor of any process, machine, or design admitted to the Exhibition, but which has not been registered or patented, by making a demand before the opening of the Exhibition, or during the first month of the opening, may obtain from the Imperial Commission a certificate describing the object exhibited.

Article LIV. This certificate ensures to the holder of the object described the exclusive privilege of using it for the period of one year, commencing from the 1st May, 1855, without prejudicing any patent that the inventor may take out before the expiration of that period.

Article LV. Every demand for a certificate of invention must be accompanied by an exact description of the object or objects to be protected, and, if necessary, of a plan or drawing of the said objects.

Article LVI. These demands, as well as the decisions which will be taken regarding them, will be inscribed in a register opened for that purpose, and which will be ultimately deposited with the Ministers of Agriculture, Commerce, and Public Works (Office of Industry), to serve as proof when needed during the time fixed on for the validity of these certificates.

Article LVII. These certificates will be given gratuitously.

Juries and Rewards.

Article LVIII. The decisions as to the rewards for articles exhibited, will be confided to a great International Mixed Jury. This Jury will be composed of Jurors and Deputies, who will be divided into thirty Special Juries, corresponding to the thirty classes indicated in Article 16.

Article LIX. The number of Jurors for each Special Jury is fixed as follows:—

For each of the classes—

For each of the classes—	Jurors.	Deputies.
Nos. 3, 10, 20, and 23 .	14	... 4
Nos. 2, 6, 16, 18, and 24 .	12	... 3
Nos. 7, 8, 12, 13, 14, 17, 19, 21, 25, and 26 . . .	10	... 3
Nos. 1, 4, 5, 9, 11, 15, 22, and 27	8	... 2

In the division of Works of Art—

Class 28 will have . .	20	Jurors.
" 29 " . .	14	"
" 30 " . .	8	"

Article LX. The number of Jurors to be appointed, will be for France, and likewise for each foreign country, in proportion to the number of exhibitors furnished by each country.

Article LXI. The Official Committee of each nation exhibiting, will appoint the persons forming the number of Jurors which it is entitled to nominate.

The French Jurors for the first twenty-seven classes, will be nominated by the members of the Imperial Commission forming the section of Agriculture and Industry, and for the three last classes, by the members of the section of Fine Arts.

Article LXII. In the case of the Committee of a country exhibiting, not appointing the Jurors who ought to represent that country, the vacancy will be filled by the general assembly of Jurors present.

Article LXIII. The Imperial Commission will divide the Jurors amongst the different classes; they will also determine the general rules which will serve as the basis of operations for the Special Juries.

Article LXIV. Each Special Jury will have a President, who will be named by the Imperial Commission, also a Vice President and a Reporter, who will be nominated by a majority of votes of the Jury.

Article LXV. In the case of no member obtaining a decided majority, the choice between the candidates having the greatest number of votes will be by lot.

Article LXVI. The President of each Jury, and in his absence the Vice-President, will have a casting vote.

Article LXVII. The Special Juries will besides be distributed into groups, representing those manufactures

connected with each other by certain points of analogy or similitude.

These groups are eight in number, as indicated in Article XVI.

The members of each group will nominate their President and Vice President.

Article LXVIII. The decisions of any Special Jury will not be confirmed until approved of by the group to which it belongs.

Article LXIX. The rewards of the first class will not be granted until they have been revised by a Council composed of the Presidents and Vice-Presidents of the Special Juries.

The Jury of Fine Arts is excepted from this rule.

Article LXX. Each Special Jury is allowed to call in to its assistance, as associates or experts, one or more persons technically acquainted with any particular articles submitted for their examination. These persons may be either selected from among the members of other Juries, or from among persons not members of the Jury, possessing the required information. The members thus called in will only take part in the labours of the Jury, as regards the particular object for which their services were required; they will only be entitled to deliberate, and not to vote.

Article LXXI. Any exhibitor accepting the functions of a Juror or Deputy Juror, will by so doing be excluded from the competition for rewards.

The Jury for Fine Arts is excepted from this rule.

Article LXXII. Those exhibitors are equally ineligible for reward who may have been called in to assist Juries, as associates or experts, but only for the particular class in which they have acted.

Article LXXIII. Each Jury can according to circumstances subdivide itself into Committees; but they cannot make any award without a majority of the entire Jury.

Article LXXIV. Special Commissioners, assisted by Inspectors of Sections, will be charged to prepare the work for the Juries, to take care that the goods of no exhibitor escape their examination; to receive the observations and complaints of exhibitors, to repair any omissions, errors, or confusions that may occur; to see that the established rules are observed, to explain these rules to the Juries, whenever necessary.

Article LXXV. These Commissioners will not interfere with the deliberations of the Juries, further than to prove facts, remind them of rules, and present the complaints of exhibitors.

Article LXXVI. The nature of the rewards to be distributed, and the general principles that will be adopted as the basis of such rewards, will be determined at an after period by a Decree, based on the recommendations of the Imperial Commission.

Article LXXVII. In every case, independently of the honorary distinctions that may be awarded, the Council of Presidents and Vice-Presidents will have the power of recommending, according to circumstances, to the Emperor, such exhibitors as may appear to merit special marks of public gratitude, or encouragement of any other nature, on account of services rendered to civilisation, humanity, art, or science; or for any considerable sacrifices, having as their object general utility, both as regards inventors and producers.

Special Rules regarding the Fine Arts.

Article LXXVIII. A French Jury appointed at Paris will determine on the admission of the works of French artists.

Article LXXIX. The Members of the French Jury of Admission will be appointed by the Section of Fine Arts of the Imperial Commission.

Article LXXX. The Jury of Admission for the Fine Arts will be divided into three sections.

The first will comprehend Painting, Engraving, and Lithography.

The second, Sculpture and Die-sinking.

The third, Architecture.

Each section will determine with regard to works coming under their own province.

Article LXXXI. The Exhibition is open to the productions of French and foreign artists who were living on the 22nd June, 1853, the date of the Decree constituting the Exhibition of Fine Arts.

Article LXXXII. Artists may send to the Universal Exhibition works that have already been previously exhibited; they will only not be allowed to send—

1. Copies (excepting those which reproduce a work in a different manner, on enamel, by drawing, &c.)
2. Pictures and other objects without frames.
3. Sculptures in unbaked clay.

Article LXXXIII. The following Articles of the present Rules apply to the Division of Fine Arts.

Articles 1 to 13; 15 to 30. Articles 35, 36, 40 to 47; 49 to 52; and 58 to 77.

(Here follow the signatures.)

AMERICAN PATENT LAW.

In the course of the discussion on the Patent Laws which took place in January and February last, it will be remembered that some allusion was made to the cost of patents in the United States, and to the fact that foreigners were charged a higher fee than citizens, and Englishmen more than any other foreigners. This, it was stated, arose from patents being dearer in other countries than in America, where the charge was adjusted according to what a citizen would have to pay in another country. During the course of the discussion, Mr. Charles F. Stansbury, who was for some time in the American Patent Office, said he had addressed a letter to the Commissioner of Patents of the United States, urging the propriety of adopting a uniform fee. In this letter, after advising that the fee should be as low as possible, and made payable in three or four instalments, he says:—

"The present law exacts a fee of 500 dollars from a British subject, and 300 dollars from any other foreigner. These high fees have always been defended on the ground of reciprocity. It has been said,—'We charge the foreigner only what he charges us.' But this plea is founded neither upon correct principle nor actual practice. It is not correct in principle because reciprocity does not mean retaliation. It simply means, as applied to this question, such an adjustment of the fee as shall put foreigners on the same footing, as regards our law, as our own citizens occupy under the laws of the foreign country. In treaty stipulations, it is a common practice for each of the contracting parties to agree with the other that they shall reciprocally be placed on the same footing with the most favoured nations; and the question what that footing is, is not necessary to be raised in order to determine whether reciprocity is established. *The agreement itself* is reciprocity. Now, reciprocity, as thus defined, would demand that we should, because other nations do so, charge the same fees to natives of all countries, without distinction; in short, it would require us to put foreigners on the same footing as our own citizens, for they make no discrimination against us, notwithstanding ours against them.

"On the principle of retaliation the British government might say, 'you charge our subjects sixteen times as much as your own citizens, and two-fifths more than all other foreigners; we will treat you in the same manner, and charge you sixteen times as much as we charge British subjects.' This would bring up the British fee to a sum which would amount to an entire exclusion of American inventors from protection here (England). There would, moreover, be no end to this war of retaliation, once acknowledged as a correct principle in international affairs. But, admitting that retaliation be the correct principle, it has not in fact been followed, inasmuch as no country in Europe,

with perhaps one exception, so far as I am able to learn, now charges as much either as 500 dollars or 300 dollars for a patent. If, then, this high fee be not demanded on the ground of reciprocity or retaliation, it would seem that the only ground upon which it can rest must be that of protection to the American inventor." Mr. Stansbury then refers to the rigid examination which all applications undergo as regards *novelty* or priority of invention,—expressing the opinion that when any doubtful case arises in this respect, the advantage is all on the side of the American inventor, and proceeds, "but it may be urged that the protection here meant is not the protection of individual inventions, but the general protection of American ingenuity against foreign competition. Had not this argument actually been urged, I should not have thought it worthy of refutation. To talk in this century of protecting all possible future American inventions is, I submit, simply absurd. It would be to shut ourselves out from the influence of human progress. It would be to throw away the aid of the intelligence of nine-tenths of the human family. It would be saying, 'We will have no part nor lot in any ameliorations or improvements which do not originate on our own soil.' The genius of the American people is opposed to such illiberality. It is their policy and their province to adopt, utilize, and improve the practical thoughts of the whole world, and to make such thoughts their willing slaves in working out the great practicable problems of civilisation. Nor is such protection in any way aided by a prohibitory fee, for, as long as the present principle of examination is retained, those foreign inventions which are excluded, and therefore useless to the American people, stand just as much in the way of the American inventor's procuring a patent as if they were admitted and enjoyed. It may be said that foreign inventions may be introduced without being protected by an American patent. This is, no doubt, true; but every one acquainted with the subject knows that, practically, the prohibitory character of the fee prevents the foreign inventor from making any effort to secure the introduction of his improvement, and no one else feels disposed to go to the necessary expense and trouble. It is a fact within my own knowledge, that hundreds of excellent inventions, well adapted to our wants, are kept out by the exorbitant amount of the fee, and have not found their way to our country through the ordinary channels of trade.

"I think I have shown that the fee is not necessary for reciprocity nor for protection. I shall now endeavour to show that it is unjust in itself, inasmuch as it is more than an equivalent for the service done. All that the present patent law does is to give the inventor a *prima facie* title, and no more should be charged by Government than will pay the cost of making the examination, and performing the necessary labour connected with the case. In other words, the patent office should be made a self-sustaining institution, not a bank of deposit for accumulated taxes, to be a bone of contention between rival departments and bureaux. But it is notorious that the patent office has always *more* than sustained itself: it has accumulated a large fund, and, under legitimate management, must continue to accumulate. But, grant that it merely sustains itself, should not the expense be equalised between all the parties concerned, and not be thrown in tenfold proportion upon foreign inventors, whose applications notoriously give the least trouble. If 30 dollars be enough for the American citizen to pay, surely 500 dollars, or even 300 dollars, is too much for the foreigner.

"This exceptional case in the American law, call it discrimination or retaliation, exists in *no other country*. The French, the Dutch, the Belgian, the Austrian governments—all issue patents to British subjects on the same terms as to their own citizens, notwithstanding the British fee is greatly higher than their own; and the English government makes no distinction whatever between natives and foreigners. To adopt a contrary principle, would be an attempt on the part of the nation so adopting, to force, in this matter, her own system of domestic policy upon sister nations—a manifest absurdity and wrong. The actual amount of the fee must be regulated by the circumstances of each government. In England it is not out of proportion to the other taxes."

In his report to the President of the Senate for the year 1853, the Hon. Chas. Mason, the Commissioner of Patents, says: "Another change connected with this subject which seems to be imperatively called for, relates to the fee required of foreigners. That fee seems to the undersigned enormous and indefensible upon any principle of justice or sound policy. If a patent is to be regarded as a downright gratuity conferred by the Government on the inventor, simple equity dictates that we should not impose more onerous conditions on the subjects of other governments than those governments exact from our own citizens. The stern rule of retaliation would ask for nothing more than such reciprocity. Within the last two years Great Britain has greatly diminished her former high rates of patent fees. It is believed that in no country in Europe are our citizens taxed for these purposes as severely as we now tax theirs. It is well known that some European governments impose a lower rate of fees on an American citizen than he would be required to pay by this Office; and yet we continue to charge a British subject 500 dollars, and any other alien 300 dollars, for that which we grant to our own citizens for 30 dollars. But the granting of a patent is not a mere gratuity by the Government; it is the recognition of an evident right in the inventor. No title to property can be more just or valid than his who has created that property. The rule of natural justice is the same in this respect whether the inventor be a citizen or an alien. * * * But there is a reason, founded in sound policy, why greater liberality should be exercised towards a foreign inventor than towards the alien owner of tangible property. He pays a consideration, which the other does not: by taking out a patent, he makes the subject thereof public property at the end of fourteen years. The benefits of the invention are then secure, and can never be lost to the world. High charges deter inventors from parting with their secrets. Many an invention is thus strangled in its birth, which, under other circumstances, might have been developed into something of vast consequence to the world. There are no lost arts under a liberal and well-regulated patent office system; and this is one of its great advantages. If foreign nations choose to place these chief means of human progress in subordination to the requirements of their respective exchequers, we are forbidden to imitate them, both by the condition of our treasury and the well-established policy of our government. * * * * * From the preceding considerations it seems evident that a great change should be made as to the fees required from foreign applicants. It is respectfully submitted, whether the most convenient, wise, and beneficial rule will not be to abolish all distinctions growing out of geographical considerations, and to charge every applicant a fair remuneration for the trouble given by him to the office, but no more. Such a course would be just, generous, and noble; seeking to raise no revenue from those who are the special instruments of human advancement, showing a confidence in the capability of our own inventors to cope on equal terms with those of all the world besides, and taking no inconsiderable step in bringing about that great brotherhood of nations for which a higher civilization is gradually preparing the world."

POSTAL ANOMALIES.

An unstamped newspaper, under two ounces in weight, pays 4d. postage from Westminster to Kensington, but only 1d. from Westminster to New York. In order to send an unstamped paper once through the post at 1d., its weight must be kept under half an ounce, but a stamped newspaper, over four ounces, may go FOR EVER for a single penny. In order to obtain the postal privilege for a paper

not a newspaper, it is necessary to give security against blasphemy and sedition, and to make a solemn statutory declaration that what is alone to be published is a newspaper. Mr. Milner Gibson has given notice for Tuesday, May 16th—" To call attention to the present unsatisfactory state of the Law affecting the Press, and to move the following Resolution :—" That it is the opinion of this House that the Laws in reference to the Periodical Press and Newspaper Stamp are ill-defined and unequally enforced; and it appears to this House that the subject demands the early consideration of Parliament."

SEWING MACHINES.

By Dr. H. Wampen.*

It is asserted of these machines that they may prove the means of emancipating all persons in every department of industry where sewing is required; in order that such branches of industry may be monopolized in a few hands, and that the great mass of humanity now employed in them may enjoy the sunshine of life without labour, or find some other more healthy, easy, and refined occupation. To enter into the questions of what there would be left of employments for a large body of the people, or what misery must be endured by them during the transition, would lead us farther than belongs to the purpose of this work. But when it is asserted by slop manufacturers of clothing that the sewing machine will not allow of the use of cotton—it is confidently to be hoped not of rotten cotton—then it is worth the attention of the public to find the difference between the *art* and the slop manufacture of this branch of industry. First, an art manufacturer of clothing never uses cotton in sewing, but the best of silk and thread, the only materials suitable for cloth. In this respect the instrument is to be commended, as it cannot do that which is blameable, although poor hungry half-starved men must. But besides this, the public should not be led to believe that a mere *flat* straight line, or *flat* curved line sewing constitutes the correct sewing of a garment. By no means; though in flat sewing the machine is for some cases useful, the sewing of a garment properly is in the *holding* of its parts, while being sewed, or put together, in such a position as that the garment, if it is cut out after a correct design and model, shall fall unconstrained, easily, and naturally to the figure for which it was especially intended. Intelligent workmen have mind, and that mind contains perceptions and conceptions of the forms of the figure, gained by studying and drawing them in all their variety. But not so has the machine, nor the machine-system trained individual who works but like a machine. This is, then, in respect to sewing, the difference between a garment made by an art manufacturer and one by a slop manufacturer, or, in other words, manufactured according to the machine system. Second, in the same breath these slop manufacturers assert that the employment of the sewing machine would prove immensely profitable if it could be made to work with cotton; and as the public demand more and more the refined, the people, instead of engaging in the heavy work, might be employed in the refined and lighter branches. This would appear as if slop and machine-system manufacturers could and would furnish the public with the refined and artistic articles of apparel or costume.

As we know, from close observation and from knowledge of the matter, that such is not the case, and farther, as the object of the work in hand is to cultivate the *refined* or the artistic and scientific part of this branch of industry, it follows that the subject finds a place here.

First, then, is the question, What does a slop manufacturer of clothing mean by the refined? Before it is answered, the principle must be pointed out to which slop or machine-system manufactory subjects everything—namely, to produce an article or garment for the smallest possible amount of cost, regardless of everything else except the greatest appearance of *fineness*, that is, the external shine, termed the refined. This *fineness*, however, consists in the thinness and soft feeling of the cloth, arising from the combination of cotton and wool in the manufacture, &c. (little cost), the result belonging to the art of cloth manufacture; and for which reason, then, the workman in a garment manufacture can have no part. Farther, as every master of a slop or machine-system manufacture never *will* or *can* comprehend that the forms of the human figure have any connection with designing and scientific modelling for garments, no one is ever employed by them in this department, though it is the only *refined*, viewing dress as a fine art, in a garment manufacture. But instead of adopting such refinement it is most positively rejected, and substituted with copies, fac-similes of patterns, in the different sizes of small, middling, and large, and all of the same kind of form, blocked out of tin, lasting interminably. Here then is stiff, hard finality, stamped out of metal, checking all progress in art, design, and science, which would suit Mr. Brunel. These tin shapes are placed in the hands of a person who, having to cut out by them, is termed a cutter, and in a strict sense of the word a cutter he must be in many ways. A rule is given to him: *the garment must be general*, and *for no especial form* of a human figure. Thus are enumerated all the departments or branches in the manufacture of garments, without finding a refined part upon which ever could or would be in a slop or machine-system manufacture a single individual employed. Indeed, it is well-known that a person of artistic skill and scientific knowledge would even be rejected. Thus, it is not true that in a slop or machine-system manufacture of garments there is a part or branch upon which any single person, still less several persons are engaged; and, lastly, the so-termed refined is but the fine (thin), set off with fine words, to make the public believe they get articles of art manufacture, when in reality those so-termed are but slop ones.

Second, having now dwelt on the system of slop manufacture, and brought with it art manufacture in the course of argument in connection, it is but just to bring also the principles of this forward, and show that the art manufacture of garments or dress is a special and true branch, which may justly be termed the refined, or in other words the artistic and scientific. It will then be admitted that in an art manufacture of dress the first *principle is the becomingness of the dress to the special form* of figure for which such dress is intended; second, the best material in real internal quality; third, the paying a remunerating price, where talent in art and knowledge in science is expended, in order that the perfect may be reached. With these principles it may fairly be presumed that the really refined is to be found and cultivated. In an art manufacture of dress, perfectly arranged, first is employed a designer and modeller, a person of thorough scientific and æsthetic knowledge of the human figure, and who is well skilled in the application of that learning to the designing and modelling art for dress, without failing to design and construct a model for *every* special dress or garment; second, persons to cut out by those designs or models. If the establishment is not sufficiently large, then the designing and modelling, with the cutting out department, are united in a foreman; or the master takes the designing and modelling part in his own hand, and employs a cutter only; or the master cuts out and employs a designer and modeller. Here we see that in an art manufacture of dress, the refined, or, in other words, the designing and modelling in dress, is really in every position paramount and cultivated, when in the slop manufacture it is as truly annihilated. Nay, the very principle of the one is to make it paramount, when the principle of the other is to destroy it.

Perhaps this slight sketch may aid the public to discri-

* Excerpt "Mathematical Instruction in Constructing Models for Draping the Human Figure." By Dr. H. Wampen. Messrs. Boone.

minate between articles going under the same name of dress, but which come from different manufacturers; and, further, it may be a caution to influential persons and societies against lending themselves as mere advertisements for spurious articles, while they kindly and good-naturedly believe themselves promoting the cultivation of art and science in connection with industry. Let every one know that when the machine system, supported by a mercantile spirit, seizes upon dress, the refined and the beautiful vanish as if touched by destruction, when in the other branches of industry it may be completely successful. The refined or the beautiful in dress is only brought forth by artistic work in the fine-art spirit, based upon a scientific foundation, namely, on the knowledge of the forms of the human figure, and cultivated in connection with it.

Third, if the public, from a deficiency of taste, is unable to discriminate between those articles of dress which are becoming to the special form of the figure for which they are made, that is to say, between the beautiful in form and the disharmonious and unsightly, then there is the more need to promote a cultivation of taste; that the public feels the real want of this cultivation is shown by its eagerly looking after fashion journals, the forms in which it takes for the really beautiful, when in truth they give nothing more than changes of form in dress void of it altogether. But to cultivate true taste in the really beautiful, sculpture and painting must take the lead, and that in a manner suiting our modern costume and time; doing so alone in ancient costume furnishes us only with the picturesque ornament, instead of cultivating taste scientifically in different kinds of form by our own figures, home apparel, and European costume; then, according to some few specimens of this which make their appearance in fine art, it is proved to be attainable.

Let us see farther if there is not also something wrong in the fine arts, similarly as we found perversion in our industrial art just named. The primitive forms of objects in nature and art in the realm of æsthetics are of the three kinds, the proportionate, the broad, and the slender; especially prominent in architectural forms and figures. We must commence by such primitive elements if we would start from inward conviction, and be really *home*. Such, however, is being demonstrated in a proper scientific course of instruction in our Anthropometry, but, in this sketch in hand it is only needful to relate how the mechanism of fine art studies is arranged. This is of two kinds: the one calculated to produce works for the picture dealer or seller, perfectly in the mercantile spirit, and which naturally must cost as little as possible. On these conditions one lay figure must suffice, which answers for both the male and female form. It is usually a female one, and raised to serve for a male figure. Here, then, are committed two faults, not only that the female form is made to present a natural male form, which can never be; but as the mechanism in such a lay figure is very confined, it cannot be extended in any other way than in the length of the lumbar region, the result is a positive ill figure,—positive incongruity in the parts, for a male figure. Now disharmony continues mixed up amongst otherwise harmonious elements, as shade and light, sentiment, expression, life, power, gentleness, &c., does violence to nature, destroying harmony, and with it the beautiful.

In respect to drapery or costume this studio is just as economically and meagrely provided. Garments from a slop manufacturer, regardless whether they are becoming, suitable, or harmonious with the form of the lay figure—male figure form it has none—are put on, and so one disharmony is mingled with another. Farther, by such meagre mechanical means one figure thus arranged must be quite finished before another can be commenced, which causes a feeling as if the whole picture were patched in piece by piece, instead of producing in the beholder the agreeable sensation which arises from perfect, undisturbed harmony. In some studios of this class not even as much as this is bestowed, but a painting is made up out of bits copied here and there.

Different is the appearance of the other studio to which we refer; it is altogether of higher tone and more truly deserving pretensions, where the art spirit works alone, for the consumer, not for the trafficker; nothing is here deficient; nothing is too costly which may assist in the production of the true and the refined natural; to call forth the beautiful by bringing in harmony constituently all the elements belonging to art. Here we find the studio furnished, for the mechanical arrangement in grouping, with three male lay figures, the proportionate, perfect to nature in all their parts. Drapery is ample, the broad, and the slender figures, and three female forms of the three same kinds. These are of life size, and not sparingly provided. Each figure has its suits of costume, specially adapted to it as corresponding in kind to its form. Not to have costumes harmonious and becoming to each kind would be a certain violation of the laws of harmony in form, just as great as if a part of one kind of form of the human figure would be substituted for a corresponding one of an opposite kind of form. Moreover, the shade and light being different in different kinds of forms, and different in groups from isolated forms, the progress is such in a piece of art that each part in the composition is kept in an equally advanced stage with the rest, from the rough sketch to the complete finish, in order that the harmony of shade and light is continuous, unbroken with the harmony in the parts of the forms. Thus is brought out of different kinds but harmonious elements a continuity of the harmonious, or rather the unbroken melody of form—the beautiful in objects of space—deep, expressive, though soft. The working from a group or groups of beautiful subjects, and a group of perfect and faultlessly draped lay figures, can truly assist to develop the above high qualities, which never can be reached by completely finishing one single figure, and then changing the model of that to finish from it a second, and so on. A group of figures should be like a landscape, remaining undisturbed until the artist has completed the whole; he must find it as he leaves it.

The models for the drapery are likewise with all care scientifically designed and constructed, and not less attention given to the proper putting together of the parts of the drapery formed after those models.

From an artist having at command such a studio or atelier so richly provided with mechanical means, it may fairly be expected he possesses the power of cultivating and refining taste, by giving natural and true harmony of form, combined with the other elements of fine arts' own special domain.

Enough has been said to shew that there are two descriptions of studios in the fine arts, as there are two sorts of them in our above-mentioned industrial branch, and it will likewise be seen where the refined and the cultivated are really produced, and where not, though assuming such. In conclusion, it will naturally be deduced from all that has been said that only the mind with its correct conceptions of the scientific (æsthetical laws in the refined and beautiful) can bring the refined and beautiful in an object of art, more especially so whenever a dressed human figure is the object; or, in other words, only a hand guided by intelligence, and not a machine of metal nor of human flesh and bones can bring forth these qualities in dress; and for that reason society would be better off as respects manufactured dress, or human apparel to reject, at least for home consumption, all machines and machine systems, and let intelligent persons work to order for the consumer. A higher standard of intelligence and morals would be the practical result among a large portion of the industrial class, with the diminution of pauperism and its attendant evils.

Home Correspondence.*

MATERIALS FOR PAPER MAKING.

SIR,—The short time which remained for discussion after the reading of the paper on Wednesday evening, precluded my offering any observations on its subject, and, therefore, I am induced to trouble you with the following remarks on one or two points which appear to me to have an important bearing on some of the matters noticed in the paper read by Dr. Royle.

One subject he prominently brought under the notice of the Society is the present high price of materials for the manufacture of paper. I believe the following figures fairly represent the comparative prices of several sorts of the staple material, rags, in the years 1852 and 1854:—

	1852.	1854.	
A	26s.	.... 32s. to 34s.	per cwt.
B	16s.	.... 20s.	„
C	11s. 6d.	.... 15s.	„
D	7s.	.... 10s.	„

Although the principal material, rags are not the only article in which a large rise has taken place, bleaching-salts, alkali, alum, hide-pieces for size, are also considerably dearer—the last-named fifty per cent.—and every one is cognizant of the greatly increased cost of the important article coal. If these advanced prices were chiefly owing to the circumstance of war, it might be considered a temporary inconvenience, but it is gratifying to think, although it increases the seriousness of the question, that the preponderating cause of the enhanced value of materials is due, not to the vagaries of despotism, but to the development of civilisation. The rapid strides of our Australian colonies have caused a very large increase in the demand for paper; and, as an illustration, I may mention that an unique advertisement recently appeared in a Sydney newspaper. The proprietors offered a high price for paper suitable for their Journal: so increasing were the number of newspaper readers that the journalists felt it necessary thus to appeal to the public for supplies of paper. This represents but a small fraction of the truth. In Hamburgh, and all the Mediterranean markets, and even in our own, our American friends are competing severely for Europe's old rags from which to make paper. A third, but I hope only temporary cause may also be named,—I allude to the strikes and general slackness amongst our cotton manufacturers; hence less cotton waste is produced, causing those papermakers who chiefly use that description of material to go into other markets for supplies. The rise appears therefore to be caused by a circumstance which every right-minded person must feel to be satisfactory—it is the increased demand for paper in all parts of the world, indicating progress of mind, growing capacity for intellectual enjoyment, and more extended ability to gratify the acquired taste for reading and writing.

The question is frequently asked, "Why do not the Americans collect their own rags?" I apprehend the answer to be twofold:—First, happily the sources of employment open are so numerous and profitable that most persons can earn more at some other occupation than collecting rags; secondly, the ability to read, and the power of purchasing newspapers, books, &c., are so universal, that the demand for paper is much greater than can be met by any possible internal supply of rags. I could wish the European nations were similarly situated, and should be willing to risk the probable effects on the price of paper.

From the best estimate I can form, I think we shall not err in setting down the cost at which manufacturers now produce the 177,633,009 lbs. weight of paper, which it may be assumed will be made this year, at £1,000,000 more than the same weight would have cost in 1852. In 1832 only 64,935,655 lbs. of paper were manufactured in Great Britain, so that in twenty years the manufacturers has nearly trebled its production, in 1853 the quantity being 177,633,009 lbs.

If the manufacture should keep at its present point only, the high price of material is likely to be permanent, but as the demand for paper will probably go on increasing, it well becomes the Society of Arts to prospect, if I may use the expression, for raw materials for this commodity. That the supply of paper will ever fail I have no fear, inasmuch as nearly a century ago paper was experimentally made from upwards of thirty different materials, and more recently attempts have been made, not without some success, to manufacture it on a large scale from plantain fibre, peat, wood shavings, hop-bines, straw, &c. Some specimens made a year or two ago from plantain fibre, were undistinguishable from good printing paper made from rags; I am not aware of the cause of suspension of operations. Experiments are still going on, I believe, under a recent patent for the manufacture of wood paper. A patent has also been recently taken out for the manufacture of paper from hop-bines. I fear the cost of reducing several of these substances to pulp will be found too great to allow of the preparation being remunerative, even at the present high price of rags.

According to the views propounded on Wednesday evening, Dr. Royle and the speakers generally seemed to regard the various fibres then described as sources of ample supply for the paper-maker. In quantity and quality I will not for a moment dispute the point, but, with every desire to see the price of paper materials low, and, in my opinion, it is second to "cheap bread" only in importance, I am certain we shall not accomplish the object by self-deception on any one important fact; and neither hopes, wishes, nor experiments can overcome market price; and on this ground I venture to express my doubts of the present availableness of the substances so ably pleaded for by Dr Royle. I find on inquiry this day, that the present market price of Manilla hemp is from 70s. to 76s.; jute, 27s. to 32s.; sunn, 27s. to 32s. per cwt.; for plantain fibre I could not obtain the quotation. Now the best white English and foreign cotton and linen rags, suitable for making writing paper, do not range above 34s. per cwt., and these suggested raw fibres would require much more chemical treatment than the rags of the same price. The rags have been brought into a textile condition from the original fibrous state at a certain cost, which has been defrayed by the use to which the rags were applied whilst in the state of garments, &c.; if, therefore, the substances mentioned on Wednesday *could* be used in lieu of the best rags it would only be a case of substitution—no advantage in price would be gained. The greatest rise, be it observed, has occurred in the lower quality of paper materials, and it is additional supplies of this description which are needed. If these new fibres be introduced for this purpose the case is still worse, manufacturers would be using a 32s. article for the production of paper, the ordinary materials for which are now only 10s. per cwt. It is not the original cost of fibre merely which must be considered, but also waste in manufacture, chemicals, cost of power, wear and tear and replacement of machinery, wages, duty, and profit, truly a formidable list of obstacles to cheapness.

Having offered these remarks on the various propositions which have been brought forward for removing the difficulty, I may be allowed to direct attention to what I conceive to be the true source of relief. I had hoped to have celebrated the repeal of the duty long ere this, but under present circumstances this happy event must be considered as indefinitely postponed; the repeal, however, come when it may, will be equivalent to an average reduction in price of about 20 per cent. The repeal of the duty, although it would to a certain extent lower the actual price of paper, would, I have no doubt, have

* The greater number of these letters were in type last week, and that from Mr. Doull has unavoidably stood over for two numbers.—ED.

a tendency to raise the price of materials by increasing the demand for the manufactured article. I should not, however, trouble you with these remarks if I depended principally upon the repeal of the duty for a reduction in price, but I am of opinion that an unlimited supply of a cheap and suitable material exists in our own country. I refer to straw. The sheet upon which I write is made entirely from straw, and leaves little to be desired for ordinary uses, and for many purposes it is preferable to paper made from rags. Moreover, less power is required to prepare the material, the process being more chemical than mechanical, an important matter when the high price of coals in some parts of the country is considered. Why, then, has this manufacture been comparatively neglected? Solely, I believe, from the circumstance that the large quantity of alkali required to prepare straw for pulp, by combining with its resinous and siliceous matters, causes that article, the alkali, to become a more important element of cost in the manufacture than the straw itself. To reduce the cost by recovering a portion of the alkali, an expensive mode of evaporation has been hitherto adopted. It has long been my decided conviction that this alkaline solution could be used as the raw material of some other manufactures, such as soap-making, or for common glass, probably both, thus saving, at any rate partly, the expense of evaporation; and the great point I wish to bring before the Society is the desirableness of ascertaining to what uses this residuum can be profitably applied. If the expense of evaporation could be saved, the manufacture of paper from straw would be rendered more profitable, and a large supply be the result, the rag market particularly for the inferior description of goods suitable for the manufacture of printing paper, be kept low, and the desired object would be thus accomplished. The proprietors of the following straw-paper mills, I believe all at present in existence, would, I have no doubt, supply some of their "black liquor" to any soapmaker, glass manufacturer, or chemist who might be disposed to try experiments with it, viz:—Tovil Mills, Maidstone, Kent; Quenington Mills, Fairford, Gloucestershire; Burnside Mills, Kendal, Westmorland; Golden Bridge Mills, near Dublin.

I understand Mr. Simpson, of Maidstone, has patented some process connected with this subject, but with the particulars I am not acquainted.

Yours truly,
WAIMA.

THE PRESERVATION OF GRAIN, AND GRAIN PRODUCERS.

Sir,—As the great leading feature of your Society and of your Journal is the advancement of the arts, both useful and ornamental, and, consequently, the moral and social elevation of the masses of the community, it is unfortunate that one of your ablest correspondents should arrogate to himself the censorship over a portion of the community, who, if not quite so respectable as your correspondent, still claim the privilege of free thought and action within the limits prescribed by law.

In connection with the recent discussion before the Society upon agricultural statistics, Mr. Bridges Adams has contributed a paper on "The preservation of grain, and grain producers," in which he thinks proper to have a fling at vegetarians and teetotallers. "The vegetarians have stumbled on a truth which they have read wrongly, and the teetotallers, with their well-meaning bigotry, have helped the mystification." Does Mr. Bridges Adams mean to say that teetotallers, with their "well-meaning bigotry," are not strenuous advocates for the preservation of grain from the destructive processes of fermentation and distillation, and also the preservation of "grain producers," or agricultural labourers, from the debasing, debilitating, and demoralizing habits of intoxication.

"To the eye of reason (continues Mr. Bridges Adams) all would be clear enough, if man would take the trouble to examine." So say teetotallers; and probably the following statistics may induce Mr. Bridges Adams, or some of your numerous readers, to "take the trouble to examine."

"Rum-selling has directly, or indirectly, cost America the last ten years, twelve hundred million of dollars. It has burned, or otherwise destroyed, five million more of property. It has destroyed three hundred thousand lives. It has sent one hundred and fifty thousand persons to prison, and one hundred thousand children to the poorhouse. It has made a thousand widows. It has caused one thousand five hundred murders, and two thousand suicides; and it has bequeathed to this cold world one million of orphan children."—*Mr. Everett, late Minister to Great Britain.*

"From the year 1801 to the year 1846, the people of the United Kingdom spent nearly fifteen hundred million pounds sterling in intoxicating drinks; about £800,000,000 on spirits; £176,445,000 on wines, and £595,904,000 on malt; or equal to about double the present national debt."—*Eliza Cook's Journal.*

But not to occupy your space with statistics in reference to the expense, or the pernicious effects of intoxicating drink, it may be safely asserted that ninety per cent. of all the vice, and all the misery, wife-beating, suicides, and murders which disgrace this country, result from the use of intoxicating drink; yet, strange to say, a philanthropist of the purest water considers those as "well-meaning bigots" who, by precept and example, endeavour to suppress a practice which carries more evils in its train than all the other vices put together.

It does not appear to be in good taste, particularly at the present moment, to class together soldiers, sailors, and paupers, as your correspondent has more than once done in his communications.

I am, Sir, yours truly,
ALEXANDER DOULL.

1, Morden Terrace, Greenwich, April 12, 1854.

PUBLIC LENDING LIBRARIES.

Sir,—The progress of the Educational movement, and the results which are beginning to be felt amongst us, require that we direct our attention to the great importance of the establishment of Public Lending Libraries, not merely in our towns, but in our villages, and wherever we hope to make the effect of an improved education to be felt. Wherever there is a school, as an essential adjunct there ought to be a Library. It approves itself at once to our reason, that, if we educate, we must provide the means of carrying on education. The first and most evident means of doing this is, by providing such a supply of mental food as the conditions require. When the lethargy of centuries was broken, and we were roused to the necessity of educating, it ought to have been clear to those who promoted it, that there was no point at which the course of education could be arrested. One and the same effort of thought ought to have convinced us that a series of provisions must be made, by which that which was commenced in the school, might be carried on in maturer life. Nothing is more injurious to the social state than trusting to one measure or to one panacea for remedying all the wants or evils that spring out of its conditions. In providing for the first enlightenment of the faculties of the mind, provision ought also to be made for their support; as we have created a taste for mental food, we must provide for it by placing within the reach of those whom we have educated, such resources as a well-selected library affords. Everything moves in this country very pedimentive. It would appear as if it were not necessary to admit with the principles we sanction their necessary results. These, after a sound basis has been firmly laid in admitted principles, are still considered open to discussion, and to require the same laboured experiences and struggle to establish them that was experienced in the struggle by which the first principles themselves were es-

tablished. We are continually, in fact, halting between two opinions, and the progress which we ought to make and hail with satisfaction from the establishment of sound premises, we are obliged to fight over again and again, inch by inch, as if the whole ground were untried, and the whole question still an open one. In determining the prior question of education, the principle of the Lending Library is clearly determined. In practice, indeed, there are very few villages, at all events in the South of England —in the North I have no experience—in which there is not something dignified with the name of a Library; and in towns, some sort of library is everywhere to be met with. True it is, in both cases, that it is very often confined to a shelf of tracts on religious or missionary subjects, carefully bound in brown paper covers. But the collections passing under this name are very various, according to the varying ideas of those who make them. Some, under favourable circumstances, form a truly useful and respectable collection of books, and their use and beneficial effect is soon seen in the improved state and tone of the locality. The question of real importance is, whether the Library be such as the requirements of the age call for. The building and endowment of a school has often been found a specific for stopping the healthy progress of education. Even the building of a church where it is not wanted has often stopped the building of one where it is. So the favourite parish shelf of tracts and penny publications, freely circulated, but little read, has often stood in the way of such a Library of healthy and practical literature, of books of general interest on subjects of science, the arts, and the requirements of every-day life, as would tend to raise, to improve, and to enlighten the locality. In looking at the libraries of an average quality now existing amongst us, we cannot fail to be struck with their general characteristics. They are almost wholly of a religious character, and of a more or less obvious tendency, the High Churchman and the Low Churchman each giving to his own little deposit his own peculiar colouring; and by the adverse separations of parishes, excellent for many purposes, but inconvenient for this, the interchanges that might at least foster inquiry and exercise mind are forbidden. That which is written, also, in these modern days under such a bias has not even the merit of the good old standard publications of former days. The spirit and nervous terseness of our older writers in putting their positions are lost in the vague definitions and party purposes of our day. The colouring is preserved, but the spirit is evanescent. Books, therefore, thus written under a bias are not qualified in the same degree as the standard books of an older date are to strengthen and to discipline the mind. The principle of dilution at the cost of terseness, closeness of reasoning, and energy, prevails no doubt as much in other classes of literature as it does in that of a religious character; it is the vice of the age, and not of any particular style of writing, but it does not produce so injurious an effect. It may convert history into a novel—this it has done largely,—general literature into a series of articles or reviews, but it cannot so deal with science, from its very nature, for, however faulty or wordy may be the exposition, there must be facts and data in scientific treatises, and there must be such a train of consecutive reasoning upon them as is necessarily calculated to strengthen and enlarge the powers and perceptions of the mind. Science, therefore, has an aptitude and a power for this particular purpose—namely, the education of the adult classes of the population who have come out of our schools,—which no other branch of literature possesses in the same degree. The middle and humbler classes of society have not the same facilities and advantages the higher orders possess in their education for the training and discipline of the mind. We must look, therefore, for other means to take the place of that exact training they undergo, and the strict definitions and close reasonings of science appear to afford us this. Any one familiar with the habits and circumstances of those whose improvement we contemplate will recognise in the impossibility of so continuing a well-directed system as to work out its own result, from the necessary interruptions that their very condition causes, the necessity of conveying knowledge in such a manner that, as it were by snatches, it may arrest their attention and fix itself in their memory. It follows, therefore, as a consequence, that when the youth has left our schools we must look for such means of continuing his education as may go with him into the field or workshop, or to his own home, to occupy his leisure hour. The library, then, we contemplate as a necessity of the day, arising out of these conditions, and consequent on the advances of education, must contain a good succession of books of science as well as the standard works of general literature. Several of our great Societies have testified to the importance of such libraries. The Society for Promoting Christian Knowledge, in its supplementary list, has endeavoured in some degree to supply the want the existence of such a catalogue admits, but this is done very inadequately, both as regards the staple of the supply and the means which it has suggested, and in many instances called into operation for procuring it. The National Society, also, has recently made overtures for the establishment of School Libraries, but it is for those who have left our schools for whom the library is required. Both of these efforts, however, are good as far as they go, but they neither reach nor supply the wants of the day. Our books ought to be able to take up and carry on what the much advanced school has taught, taking up the scholar at the point where the schoolmaster, or, to speak more properly, the necessities of his own condition, have caused him to stop. The Society of Arts, in its book purchases for its affiliated institutions, has more nearly approached the fulfilment of the object proposed than any other effort that has been made; but still we can look on it only as an indirect means of gaining an end, and its most zealous promoters will not assign to it the accomplishment of that which the circumstances and condition of the adult classes require. In its largest sphere it only embraces the Institutions in towns. Through these Institutions it may reach a considerable mass of the town population, but any one who watches the working of these Institutions will admit that it includes in a very small degree the classes we are desirous of reaching. The present proposals for realizing the benefits of union by examinations and certificates will, no doubt, do much to give a healthier tone to the operations of these Institutions; but we must not expect too much from any one measure, and we must always bear in mind how few by comparison these arrangements, unless they be very materially enlarged, can possibly embrace. To make it embrace all the classes whose benefit we contemplate, we must secure to them both in the town and country the means of educating themselves, that they may thus be enabled to come up to the requisite standard. Unless we secure this, it may be a question whether we act altogether impartially towards the rural population, whether we do not give to the larger populations, those who are, and who ought to be, the best capable of helping themselves, a monopoly of advantages which fairness requires should be fully offered and extended to all. A first step and instalment would be the establishment of libraries. The promotion of such libraries, will, I hope, be taken into the serious consideration of the Council of the Society of Arts. They would remove the difficulties and inequalities of our present condition, and prepare more fully and fairly for the application of the principle embodied in the diplomas of the Society. That difficulties of detail will exist in carrying out any general provisions of libraries, there cannot be a doubt, but what is the object we hope to attain? Is it worthy of the exertions of those whose aid and whose energies must be called into operation? Is it large enough, as a measure of moral and social improvement, to stir and enlist the sympathies of those who are ever ready to aid a good and benevolent object? If it be—and no one who

considers it in all its details and appliances will for a moment doubt it—why then it will not want the assistance it may require, nor will the intricacies and difficulties into which it may lead us deter the ardent and enlightened perseverance of those who, throwing off the shackles with which it has been attempted to tie down and fetter intellect, have endeavoured, through the judicious and steady co-operation of the Society of Arts, to raise throughout the country the standard of intelligence. The present condition of the general question appears to bring under our consideration a great necessity, which ought to draw our attention to the manner in which it may be met. On the general principle there will be neither doubt nor misgiving: I will assume it as proved; but in the details many a question may arise, and it is to these, therefore, that we must address ourselves.

S. B.

THE NEW PROCESS OF MAKING BREAD.

SIR,— I have been somewhat surprised to find that so much attention has been bestowed upon M. Journet's new process for making 136 loaves in lieu of 90, the usual number to the sack of flour, a process which will enable the directors and guardians of the parish of *Sainte Marie la Bonne*, to defraud the poor to exactly the same extent, for they are only bound to distribute so many four-pound loaves to each, and M. Journet's bread can only contain the nutriment belonging to one sack of flour. If the converse had been M. Journet's object, that is to say, to make a smaller number of four pound loaves, of equally light texture, out of a sack of flour, I should have considered it a very valuable process, and a boon to the public.

Should our English bakers adopt the new process, it will be a direct fraud and robbery to the consumer, for they already make too many loaves of one sack of flour, and adopt the most abominable means to accomplish their object. They oblige the millers to supply them with flour made from very old wheat—the older the better—well browned by over heating in rotten ricks, and well frost-bitten, because they have found out that flour made from such deteriorated corn will take a much greater quantity of water than flour made from new, and yet make a stand up loaf of good appearance. Then the alum and other chemicals so largely used by our bakers, have precisely the same tendency, easily proved by boiling a little flour and water paste, which will run to water in a few hours unless alum be added. It is by such means that they are enabled to sell so large a proportion of water to their customers at the price of flour, which latter they never purchase unless made from half-perished wheat.

In fact the whole system is one of fraud and robbery, for it is well known to many, and I have had numerous opportunities of proving it, that nothing more is requisite to make good, wholesome, light bread, than flour made from well dried new wheat, pure water, and a little sweet barm or leaven.

It is also a very strange circumstance that the scientific gentlemen who superintended M. Journet's experiments, did not cause the whole of the ingredients used in both the old and new processes, to be accurately weighed before mixing. If they had done so they would have found that M. Journet used exactly as much more water as his bread was increased in weight, allowing, of course, for the weight of his secret ferment, if greater than that used in the old method, which I have already shown to be quite bad enough, and does not require to be made worse.

Another severe test to show the trickery, would be to place a few loaves of each sort in a powerful drying-room, in order to force out every particle of moisture, when, of course, that bread which had lost most weight would have contained the largest proportion of water.

I am, Sir, your obedient servant,

HENRY W. REVELEY.

April 17th, 1854.

INDIAN FIBRES AND ENGLISH FLAX *versus* RUSSIAN HEMP AND FLAX.

SIR,—At the request of Dr. Royle I forwarded to the Society yesterday, two large parcels, containing several specimens of Indian fibres, that I had had from him and from merchants in the City, who are large importers of hemp and flax. I had reason to hope that the meeting would have had its attention drawn to my samples, in order that they might examine the rough, unprepared fibres, and observe the improvements made on similar fibres that I had prepared by my patent machines and patent liquid; but as there was no space on the table to admit of my specimens being opened for inspection, and as Dr. Royle did not think of my samples until the end of the meeting, I should feel greatly obliged by your having the two parcels of specimens opened out on a separate table, and so distributed as to admit of their being inspected for a few days by parties wishing to see them. It will be seen by the improvements I have made on them, that Dr. Royle is justified in his efforts to bring the British merchant to a knowledge of the superiority of Indian fibres over Russian hemp and flax; and as he in a very able manner proved that there is in India material to satisfy any demand, however great, for fine as well as coarse spinning, a supply that cannot be had from Russia, if we were at peace with that country to morrow, I shall venture to suggest, what will, in my opinion, be a further inducement to capitalists to employ their money in Indian produce.

In order to induce British farmers to turn their attention more to the cultivation of flax than they have done in this country, I commenced in 1843, and collected from the Board of Trade Office, the yearly imports of flax, oil cake, and flax seed from Russia, Belgium, &c., and, on fixing an average price to each of the three articles imported, I found that this country pays away better than SEVEN MILLIONS STERLING ANNUALLY, and that Russia gets nearly two-thirds of that sum. Now, as that trade is at present at an end, what, may I ask, will the British merchant do with these four or five millions sterling that they paid away yearly into the Russian exchequer. If they wish to hold their customers, they must have a supply from some quarter, and, from the experiments I have made on all kinds of fibre, I fearlessly assert that they can have a cheaper and better supply of fine and coarse fibre from India, for rope makers and fine spinners, that it is possible for them to get from any other country, and the samples in the Society's rooms are a proof.

Dr. Royle gave a very correct account of the superiority in the strength of the Himalayan hemp compared with that of Russia, but as that is not the only advantage to be gained by the importers and consumers of hemp, I think when we have arrived at a crisis that cuts off our supply of material, it is a duty, as well as an advantage to me, to explain how the fibres of India may be prepared in England and sold at such a price as to induce British merchants to import them.

I have made the Himalayan hemp so soft, fine, and white, that it will not only take the place of Petersburgh flax, now £60 per ton, the best of which can only make 40s. warp yarn, but it can be used in place of Dutch flax at £80 per ton, and I speak from 20 years' practical knowledge when I say it is capable of being spun into 60s. warp yarn. I first cut it up into two lengths, and so break it up and clean it by my patent machines as to allow my patent liquid to penetrate it; by this process it is so softened and divided that it will split when drawn over the fine hackles as fine as any Dutch or Belgian flax.

The Rheea fibre, or assam grass, when so prepared by the machines and liquid, is a finer, and consequently more valuable fibre. It is equal in strength and fineness to China grass at £100 per ton. The yercum, which very much resembles Belgian flax, is also well calculated for prime warp yarns, and worth £100 per ton. The Neelgherry

nettle is a most extraordinary plant; it is almost all fine fibre, and the tow is very much like the fine wool of sheep, and no doubt will be largely used by wool spinners. The pine apple and jute for fine purposes cannot be questioned, and nothing can for strength come up to the Calcutta hemp. The *yucca gloriosa* (Adam's needle) produces a white fibre, that will, when made into a rope, lift a fourth greater weight than a rope of a similar size made from Russian hemp, and it is said that a rope made from the ejoo fibre will raise considerably more weight than a similar rope made from Russian hemp. The Madras hemp, and Bombay and sunn hemps will at all times command a market, when properly cleaned out, at £45 to £50 per ton, for twines or common purposes. The plantain requires no comment, its value being known in the market. But then there is one other fibre more worthy of remark than all the others—the fibre obtained from the *ananassa sativa* (wild pine apple) would command any price, from £150 per ton upwards, for the spinning of yarn for the fine cambric manufactures in Ireland, as the fibre is finer than anything yet discovered.

By the same patent machinery and liquid I prepare flax in the green state, as it is taken from the field, and, as I avoid a great waste and loss of the finer filaments of the flax, which the old system of retting occasions, by not allowing any time for decomposition to set in, by finishing the fibre for market in six hours, I get fully one-third more fibre from a similar weight of flax straw, than those who follow the old practice of retting, and my tow is worth sixpence per pound, or double what retted tow sells for. The long flax is strong, white, more silk-like, and finer than if done by any other process, and will fetch from £100 to £200 per ton. The same machines and process will so improve FRIEZLAND, ARCHANGEL, NEW ZEALAND, and EGYPTIAN flax, as to make it worth double the first cost, and the blue or dark colour may be retained if thought desirable. I neither use soda, sulphuric acid, chloride of lime, nor any of the known bleaching liquids or alkalies, to injure if not burn the fibres.

The following is the result of working my machines on Tuesday last, in the presence of gentlemen from the City who are connected with the hemp and flax trade:—English green flax straw, from the factory of Mr. Smith, of Greenwich. Fourteen pounds of this straw, weighed on its arrival on Tuesday, in the presence of Mr. Simpson and Mr. G. Noble, flax merchants, George-yard, Lombard-street, London, it was converted in twenty minutes into marketable fibre, and produced four pounds of clear flax, and one of tow, total—five pounds. The newest and best machines in Ireland cannot produce more than one lb. twelve oz., to two or two and half lbs. of clean flax, out of ten lbs. of retted straw; and it requires fourteen lbs. of green straw, such as I worked, to make ten lbs. of retted straw. (See Tuesday's *Banner of Ulster*, Belfast, containing a report of experiments made by a committee of the Royal Flax Society, Belfast.) From this it is evident I have produced in flax and tow double the quantity from the same weight of green flax straw. Hoping that this may be thought worthy of insertion in the *Journal of the Society of Arts*.

I am, Sir, your obedient servant,

J. H. DICKSON.

British and Foreign Flax Works, Grove Street, Deptford,
April 12, 1864.

P.S.—I beg to add, twenty per cent. will cover the loss in weight in converting the green fibre into a perfectly white state, and therefore the expense of bleaching linens will be dispensed with. J. H. D.

WATER-METERS.

SIR,—A good water-meter should possess the following qualities:—

1st. It should register the quantity accurately under all ordinary and varying pressures.

2nd. It should transmit the pressure.

3rd. It should not be liable to derangement, being made of sufficient strength, and capable of resisting concussions arising from the momentum of the water being checked; and further, being so constructed that as little of the metallic rubbing surfaces should be exposed to the action of the water as possible.

Lastly. It should be obtainable at a low price.

Meters (of which I consider that designed by Mr. Siemens to be the best) have long been used for measuring considerable quantities of water, such supplies as are required for manufacturing purposes, and their application has been followed by several advantages.

For example—not only do they prevent disputes between the consumers and the water companies, but, in conjunction with a continuous supply, they obviate the necessity of erecting large cisterns to measure the quantity consumed; and when employed to register the water required for steam boilers, meters become a very excellent means of discovering the duty done by, and testing the value of, the fuel employed, for no better test can be obtained than the quantity of water evaporated.

Any one who, like the writer, has been engaged in testing coals, will readily appreciate this.

As is well known to those connected with the water supply in our large towns, it has been the desire of both companies and corporations in whose hands the supply was vested, to introduce meters, but the great bar to their general application has been the cost.

Without adequate information upon the subject, many persons have argued that because gas was supplied by meter a similar system might be adopted with respect to water required for domestic purposes, but a little consideration will show that the cases are different. A gas meter costs say one-half(a) of the annual value of the gas passed through it, but although the value of gas and water per 1000 cubic feet approximate, still the quantity of gas consumed by a household is so much greater than the quantity of water, and the cost of the water-meters hitherto introduced is so much superior to the cost of an instrument for measuring gas, that a water-meter would cost about twice the annual value of the water passed through it.

Nor is this all, for we have not yet obtained an instrument for measuring water at all to be compared with gas-meters in durability and non-liability to derangement. There can be little doubt concerning the advantages to a water company which would attend the general introduction of meters, and the consumers would also be benefitted, although there might be an objection taken to the supply of water to the poorer classes being paid for by measurement, upon the ground that it would lead to its being more sparingly used.

The water rate is too frequently viewed in the light of a tax, but this feeling would disappear if the water was sold by measurement, and a more equitable system of rating would be obtained.

The chief advantages, however, would probably remain on the side of the companies, inasmuch as meters would prevent the waste of water, and, under the system of constant supply this is in many places an evil of some magnitude.

In New York, for example, the quantity of water withdrawn has been equal to ninety gallons per individual per diem; at Boston (U.S.), sixty-six gallons; Philadelphia, fifty-three gallons; and although fifty gallons per individual per diem is not considered too much in America, still the above figures show some carelessness in the use of the water.

In Glasgow, where the system of constant supply has been in operation nearly half a century, the daily supply is above thirty-five gallons per individual, and the inhabitants want more; and although the quantity actually used is very great compared with some other places, still

(a) It will vary with the size, &c.

a considerable portion runs to waste, partly from the difficulty of getting people to keep the taps and apparatus in good condition.

A power of inspection, besides being inquisitorial, does not appear to be sufficient to check waste or the surreptitious use of water, and so far has this been carried in some instances, that pipes have been found inserted into drains without taps, so that a very large quantity of water was taken without the company's knowledge.

Although a most difficult problem, a meter fulfilling the requisite conditions will no doubt yet be obtained, and whilst much credit is due to the many ingenious persons who have spent both time and money in the pursuit, it may be safely affirmed that the very best thanks of the water companies will be his who designs a meter applicable to domestic supply.

MICHAEL SCOTT, C.E.

Proceedings of Institutions.

Basingstoke.—Great and active preparations are making at the Town-Hall for the approaching Exhibition of Works of Industry and Art in connection with the Mechanics' Institution, which is to be opened on Monday next, the 1st of May. H.R.H. Prince Albert has kindly condescended to patronise the Exhibition, and has sent a marble bust of the late Duke of Wellington, by Adams. The Exhibition promises to prove very attractive, the various objects forming together a collection such as, it is believed, was never before seen in the county of Hants.

Bedford.—The Annual Meeting of the members of the Literary and Scientific Institution for the election of officers, &c., was held on Monday week. Wm. Blower, Esq., Mayor, President of the Institute, took the chair. The Secretary (Mr. Coombs) read the Report, of which the following is a brief abstract: The past year has been one of progress, and the Committee congratulate the members on their favourable position and prospects. There are 208 members, being a considerable increase on the previous year. Lectures have been given by Mr. Partington, Mr. E. Wheeler, Mr. W. Hughes, Mr. Cowden Clarke, Mr. George Dawson, the Rev. E. Bayley, Incumbent at Woburn, and the Rev. G. W. Conder, of Leeds. Two concerts have been given by the amateurs of Bedford, under the direction of Mr. John Nunn and Mr. Joseph Gostick, respectively. Donations of books have been presented by several gentlemen in the town, and by the Council of the Society of Arts. A mutual improvement class has been established, and meetings held fortnightly, when short papers are read by members, and various literary and scientific topics discussed. The Institution has removed from its rooms in Well-street, to the Bedford-rooms, where a Reading-room is now open from 10 A.M. until 10 P.M., and is well supplied with daily papers and other periodicals. In taking this step the committee are supported by a liberal subscription of ten guineas per annum from William Henry Whitbread, Esq. The advantages of our union with the Society of Arts will, we have no doubt, become more apparent as we make progress. Already we derive a great benefit in the guarantee we have for the respectability and competency of occasional lecturers. For want of such a guarantee, great mischief has been done in many rising institutes besides our own. At the suggestion of Mr. White, a special subscription was made towards the purchase of books for the library, and about £35 was contributed for this object. There are now upwards of 600 volumes in the library, and the committee intend to appropriate so much of the current income of the Society as shall keep the supply of books in due proportion to the increase of members. It is proposed that a class for the cultivation of music shall be permanently attached to the Institution; Mr. Gostick has kindly undertaken to give to it his general superintendence. The treasurer reports a balance in hand of £22 7s. 6d. The officers were all unanimously re-elected. Votes of thanks were unanimously voted to the Mayor, as president, to Mr. Sewell, as librarian, and to the secretary.

Camberwell.—On the 13th instant, Mr. C. Charles delivered an entertaining lecture, at the Literary and Scientific Institution, "On Comic Characterization." In commencing his subject, Mr. Charles stated that characterization is attainable by the pen or the person, in the ideal creations of the author, or the actual embodiments of the impersonation; and that in their delineations both had "to hold the mirror up to nature," which need not restrict the aspirations of true poetry. The histrionic art he regarded in its integrity, as an estimable one, and cited the valedictory lines of Wordsworth on John Kemble in its behalf. The art of mere story-making, wherein the French are so prolific, Mr. Charles represented as very subordinate to that of characterization; and condemned those English imitations of the French novelists and their harrowing incidents, as tending to vitiate the taste, and frustrate one of the chief ends of education. He maintained that the circumstance of the story should grow out of the association and contact of well-drawn character—the process pursued by Shakespere and Dickens, who in so doing had followed the course of nature herself: that the human race were for the most part the authors of their social conditions, and not the helpless creatures of underived circumstance. In illustrating his subject, Mr. Charles selected for the evening, Sir John Falstaff; Capt. Fluellen, and Pistol; Box and Cox; and Rory O'More, which he treated with great humour and cleverness. On the 21st inst., an entertainment was given at the same Institution, by the Misses Bennett and Mr. J. A. Fairbairn, whose performance of some of the most admired melodies of Scotland gave unqualified satisfaction, and elicited frequent and hearty applause. Without any attempt at effect, the simple style in which the pleasing strains of Scotia's music were rendered created a marked impression upon the audience. As an instructive and amusing entertainment, particularly adapted for the audiences of Literary and Mechanics' Institutes, it deserves encouragement and recommendation.

Carlisle.—A soirée was recently held, at the Lord-street Reading Room, of the members of the Working Men's Library. Mr. Philip Howard, of Corby, presided. Among the speakers were the chairman, the Dean of Carlisle, the Reverend B. A. Marshall, and Dr. Elliott. It appears that the members of the institute number 250, nearly the whole of whom are constant attenders and readers. The income for the two years ending October last, everything included, was 163*l.* 0*s.* 10*d.*, and the expenditure for the same period, including interest on a debt of 137*l.*, was 159*l.* 16*s.* 3*d.*, leaving a balance of 3*l.* 4*s.* 7*d.* The room is open daily from eight a.m., till ten p.m. The committee defended its being open on Sundays, on the ground that, if the institution did good at all, it would do good on that day as well. They do not think that any one is kept away from church, but believe that if the room were closed the members would pass their time elsewhere, and not so profitably. Mr. Philip Howard made especial reference to some of the remarkable events which, allied with industry, signalized the past year. He first noticed a stupendous work just executed under the guidance of Mr. Stephenson, the celebrated engineer—the talented son of that robust-minded man, who, by the strength of his own intellect, reached the summit of professional eminence. Mr. Stephenson had just succeeded, aided by the skill and prowess of able Piedmontese engineers, in carrying a railway from Turin to Genoa, over the reach of the Appenines. It had been found that the wonderful engine—the steam engine—could be carried up steeper ascents, steeper gradients, than had hitherto been thought practicable; and this, too, with no diminution of speed. Mr. Stephenson had now carried the railway from Turin to Genoa—the capital of a renowned republic and the birthplace of Columbus, who gave to mankind a new world and to the emigrant a home. Some other able men connected

with industry—Sir Charles Fox and Sir Joseph Paxton—had lately been requested by the King of Prussia to execute some works near Berlin. These gentlemen had been received with distinction by the monarch of that intelligent people, and they would no doubt be the means of spreading the reputation of Englishmen to that distant part of the world. Turning their attention to another quarter of the globe, they found a gentleman well-known to them all, and intimately connected with Carlisle—Mr. George Mould, of Coledale Hall—employed in carrying a railway into the romantic region of Spain, from Santander; a work which, when carried out, would place that country more within the reach of the English traveller, where he will be enabled, through the efforts of English skill, to behold that interesting land, where man still retains much of the freshness of originality that has been lost to many other countries. Dr. Tait, Dean of Carlisle, addressed himself to the "real" assemblage of working-men before him. He recommended conciliation between masters and men—fair wages on one side and good conduct on the other. He urged the working classes to educate their children, even at the risk of pinching themselves.

PEMBROKE DOCK.—The Committee of the Mechanics' Institute having decided upon one night in the week being devoted for the purpose of "papers" being read on various topics, open to all members for discussion, the first meeting took place on Thursday week, when Mr. S. H. Good read a paper on "Decimal Coinage." Mr. Good stated that to substitute a decimalized coinage in lieu of the present currency would be found a difficult matter, and the advantages of the change were questionable; but to accomplish the wished-for reformation in our money notation, without disturbing the prevailing notions of value, or interfering with the established nomenclature of pieces of money, nothing more would be necessary than for the government to enact that henceforward no account should be legally recoverable unless rendered according to a decimal notation.

POOLE.—The Lecture Session at the Mechanics' Institute was concluded on the 17th inst., when the Rev. George Waterman, M.A., delivered his third lecture on "The Creation, Considered in the Light of Scientific Research and of Revelation." The subject was divided into three parts, a separate evening being devoted to each. The first embraced an inquiry into the "Geological History of the Earth;" the second, the "Astronomical History of the Earth;" and the third, the "Mosaic Creation."

TENTERDEN.—The annual meeting of the members of the Mutual Improvement Society for the sale of periodicals and papers was held in the Society's rooms, on Monday evening, April 3rd. The Society during the past session has increased in usefulness. The Discussion Class—a very important feature in such institutions—has been conducted with great spirit. The following lectures have been delivered in connexion with the Society during the past session:—"On the Life and Writings of Leigh Hunt," by the Rev. R. E. B. Maclennan, Canterbury; "Luther and Zwingle—a Contrast," by the Rev. J. S. Skinner, Folkstone; "On the Life and Writings of Galileo," by J. Brent, Esq., Canterbury; "Homes of the East, or a Glance at Oriental Domestic Life," by the Rev. C. Rutland, Canterbury.

MEETINGS FOR THE WEEK.

MON. Horticultural, 1.—Annual Meeting.
Royal Inst., 2.—Annual Meeting.
British Architects, 8.—Annual Meeting.
Entomological, 8.
Chemical, 8.

TUES. Royal Inst., 3.—Prof. J. Tyndall, "On Some Phenomena of Heat."
Linnæan, 8.
Civil Engineers, 8.—Mr. D. Chadwick, "On Water Meters."
Pathological, 8.

WED. Royal Botanic, 3¾.
Geological, 8.—1. Rev. Prof. Sedgwick, "On the Geology of Some Parts of North Wales. 2. Mr. L. Horner, "On Some Intrusive Igneous Rocks at Cawsand Bay, near Plymouth." 3. Mr. J. O. Westwood, "On Some Fossil Insects."
Society of Arts, 8.—Mr. W. Miller, "On the Decimalization of Coins and Accounts."
Ethnological, 8½.—Soirée.

THURS. Royal Inst., 3.—Mr. M. T. Masters, "On Botany."
Zoological, 3.
London Inst., 7.—Mr. C. Cowden Clarke, "On Great Novel Writers."
Antiquaries, 8.
Royal, 8½.

FRI. Architectural Assoc., 8.
Botanic, 8.
Royal Inst., 8½.—Dr. Noad, "On the Manufacture of Iron."

SAT. Royal Inst., 3.—Prof. Faraday, "Observations on Mental Education."
Royal Botanic, 3¾.
Medical, 8.
Asiatic, 8½.—Major.-Gen. Briggs, "On the Properties of the Productions of the Coccum Lacca."

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 21st*, 1854.]

Dated 6th March, 1854.

533. D. Barr, Ludbrook park, Surrey—Combined hair brush and comb.

Dated 11th March, 1854.

588. J. C. Hall, Monk-Wearmouth—Windlass.

Dated 28th March, 1854.

712. J. Woodward, Acton street—Stopping shot holes in ships.
714. A. Hodgkinson, Belfast—Bleaching linen.
716. H. Francis, West Strand—Crushing, &c., ores.
718. F. Chambon and Meyniac Chaylard—Bleaching silk.
720. E. and J. Rowland, Manchester—Metallic springs.

Dated 31st March, 1854.

738. J. M. G. Coste, Passy, near Paris—Revivifying animal charcoal and obtaining prussiates.
739. A. D. Brown, Glasgow—Furniture.
740. H. Homewood and J. Gregory, Mount street, Lambeth—Fire escape.
742. W. E. Newton, 66, Chancery lane—Carpet manufacture. (A communication.)
743. A. V. Newton, 66, Chancery lane—Carpet manufacture. (A communication.)

Dated 1st April, 1854.

745. F. S. Thomas, 17, Cornhill—Locomotives.
747. Sir R. Juckes Clifton, Bart., Clifton hall, Nottingham—Percussion shell.
749. A. E. L. Bellford, 16, Castle street, Holborn—New fabric for boot and shoe soles, &c. (A communication.)
753. W. Smith, Witney—Mop.
755. W. Kestell, Barnham—Cementing glass to metal.

Dated 3rd April, 1854.

757. T. Scott, Brighton—Propelling.
758. J. Forsyth, Caldbeck—Preparing wool, &c.
759. P. A. F. Bobœuf, 16, Castle street, Holborn—Electricity to military strategy, &c.
760. W. Ashdown, 167, Piccadilly—Gas stoves.
761. R. E. Hodges, Southampton row—Connecting gearing, &c.
762. W. Gossage, Widnes—Soap.
763. G. Devincenzi, Grosvenor street—Ornamented surfaces for printing from, &c.
764. C. Walker, Bury—Steam engines.

Dated 4th April, 1854.

765. J. Gurney, Bradford—Spinning wool.
766. J. Higgin, Manchester—Separating metals.
767. J. Swarbrick, Baxenden, near Accrington—Steam boilers.
768. J. Bentley, Liverpool—Breech loading fire-arms.
769. H. Seebohm, Bradford—Preparing wool, &c.
770. G. S. Parkinson, Westbourne Park road—Railway breaks.
771. B. Samuelson, Banbury—Cutting turnips.
772. R. Brisco, St. Bees, Cumberland, and P. S. Horsman, St. John's, Beckermet, Cumberland—Heckling machinery.
773. Capt. H. Y. D. Scott, R.E., Woolwich—Cement.
774. A. V. Newton, 66, Chancery lane—Raising and forcing fluids. (A communication.)
775. F. G. B. Capouillet, Brussels—Generating heat. (A communication.)
776. J. E. Mc Connell, Wolverton—Wheels, axleboxes, and brakes for railway carriages.
777. J. H. Glassford, Glasgow—Lithographic and zincographic printing.

Dated 5th April, 1854.

778. H. Blatter, Paris—Thermometers.
779. W. Gilpin, 2, Moorgate street—Electrical communication.

780. G. Ross, Falcon square—Preventing alteration of bank bills. (A communication.)
781. W. E. Newton, 66, Chancery lane—Printing piece goods. (A communication.)
782. C. Bekaert, Paris—Doubling, twisting, and winding flax, &c. (A communication)
784. J. Harlow, Birmingham—Metal bedsteads.
785. S. R. Smith, Bristol—Raising sunken vessels.
787. W. R. Gillard, Kirby street—Colouring substances used in bookbinding.

Dated 6th April, 1854.

788. J. Weston, Norwood—Motive power.
790. W. G. Craig, Newport, Monmouthshire—Communication on ship-board.
792. J. Nash, 3, Thames parade, Pimlico—Sugar.
794. A. E. L. Bellford, 16, Castle street, Holborn—Sewing machines. (A communication.)
796. E. Dupont, Boulogne sur Mer—Cements.
798. J. Chanes, 4, Davies street, Berkeley square—Ribs of umbrellas, &c.
800. J. Bernard, Club Chambers, Regent street—Stitching.
802. J. H. Johnson, 47, Lincoln's inn fields—Water extractor for drying cloth. (A communication.)

Dated 7th April, 1854.

805. A. Taylor, Warwick lane—Moderator lamps. (A communication.)
806. H. Moss, 19, Mansfield street, Cavendish square—Quartz crushing, &c.
808. P. A. Le Comte de Fontaine Moreau, 4, South street, Finsbury—Photographic paper. (A communication.)
809. L. F. Sangrin, Paris—Stereoscopes.
810. R. Harling, Clerkenwell—Multiplying power.
811. J. Jopling, Bishopwearmouth—Preserving tuyere from action of fire.
812. W. H. Bentley, Bedford—Irrigators.
813. T. Wood, Manchester—Centrifugal machines.
814. J. Rankin, Liverpool—Cleaning corn and seed.
815. H. B. Condy, Battersea—Concentrating beer, ale, &c.
817. J. R. Johnson, Stanbrook cottage, Hammersmith—Type.
818. J. H. Johnson, 47, Lincoln's inn fields—Alkaline steam washing apparatus. (A communication.)
819. W. Rigby, Manchester—Engraving metallic cylinders.
820. W. Naylor, Norwich—Locomotive engines.
821. W. Naylor, Norwich—Power hammers.
822. W. E. Newton, 66, Chancery lane—Stereoscopic pictures. (A communication.)
823. T. Whitehead, Leeds—Preparing, &c., flax, &c.
824. J. Corlett, Luimbres, France—Scutching fibrous substances. (A communication.)
825. A. V. Newton, 66, Chancery lane—Weaver's harness. (A communication.)

Dated 8th April, 1854.

829. W. Worbys, Ipswich—Separating grain from straws.
831. C. B. Clough, Tyddyn Mold—Coffins.
833. G. Savage, Stoke Bruen—Bricks and roofing tiles.

APPLICATION WITH COMPLETE SPECIFICATION FILED.

870. W. Ridgway, Hanley—Ovens and kilns.—15th April, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed April 21st, 1854.

2431. Christopher Cross, of Farnworth, and James Crosby, of Manchester—Improvements in machinery or apparatus for weaving.
2434. Charles Nicolas Michel and Augustin Lecomte, of Paris—Improvements in windows.
2436. John François Félix Challeton, of Paris—Improvements in carbonizing and distilling peat, coal, wood, and other animal, vegetable, and mineral substances.
2441. Harry Bentley, of Salford—Improvements in steam boilers, and in the method of setting or fixing the same.
2448. Henry Kraut, of Zurich—Improvements in apparatus for regulating the temperature of stoves and furnaces, and of water, air, or other fluids contained in vessels or chambers, the strength of spirituous liquors and of chemical mixtures, and the hygrometric state of the air in buildings, rooms, &c.
2452. Edward John Montagu Archdeacon, of Gravel lane—Improved method of indicating places, divisions, or contents in directories.
2493. Joseph Gurney, of St. James's street—Improved mode of treating waterproof fabrics.
2541. Frederick Lipscombe, of 233, Strand—Improvements in obtaining steam power, and in regulating the same.
2547. Peter Mc Gregor, of Manchester—Improvements in machinery for spinning and doubling.
2696. Emanuel Wharton, of Birmingham—Improvements in the manufacture of railway wheels.
2703. Robert Jamieson, of Paddington Edge Hill, West Derby—Improved mode of communicating from vessels to the shore, or from one vessel to another.
2731. James Lovell, of Glasgow—Improvements in the application of heat to various useful purposes.
2741. Alexandre André Victor Sarrazin de Montferrier, of Paris—Improvements in wheels for vehicles on common roads and railways.
2817. John Gwynne and James Egleson Anderson Gwynne, of Essex wharf, Strand—Improvements in the manufacture of fuel, its preparation and applications for the reduction of ores, fusing and refining metals, cementation, or making steel, and treating salts. (Partly a communication.)
109. Henry Holland, of Birmingham—Improvements in the construction of parts of umbrellas and parasols.
267. James Hargreaves and James Fletcher, both of Facit, near Rochdale—Improvements in machinery for preparing to be spun cotton and other fibrous materials.
319. John Taggart, of the State of Massachusetts, U.S.—Improved machine for excavating earth.
359. Arthur Jonson, of Mitcham—Improvements in preparing barley and grits or groats.
369. George Fergusson Wilson, of Belmont, Vauxhall—Improvements in preparing oil, and in the manufacture of candles and night lights.
377. George Fergusson Wilson, of Belmont, Vauxhall—Improvement in the manufacture of lubricating matters.
385. Joseph Hinchliffe, junior, of Dam side, near Halifax—Improvements in metallic pistons, for tightening or adjusting the packing of the same; and also improvements in the construction of such pistons.
401. John Chisholm, of Holloway—Improvements in the purification of gas.
403. Harvey Hilliard, of Glasgow—Improvements in apparatus for cleaning and sharpening table cutlery.
405. William Milner, of Liverpool—Improvements in locks for safes, which said improvements are applicable to locks in general.
407. John Elrie, of Glasgow—Improvements in photographic pictures.
409. Frederick Osbourn, of Aldersgate street—Improvements applicable to the cutting out of garments.
423. William Charles Theodor Schaeffer, of Stanhope terrace, Hyde Park gardens—Improved mode of recovering the fatty matters contained in waste waters of woollen mills.
441. Peter Fairbairn, of Leeds—Improvement in machinery for winding slivers of flax, tow, or other vegetable fibrous materials into laps or balls.

Sealed April 24th, 1854.

2451. Charles Brewster, of Dunmow—Improvements in printing machinery. (A communication.)

Sealed April 25th, 1854.

2459. John Drumgoole Brady, of Cambridge-terrace, Hyde-park. An appendage to knapsacks.
2465. William Bottomley, of North Bierley—Improved machinery for hand and power-loom weaving; and especially applicable to weaving figured fancy, and checked goods, with any number of picks, by Jacquard engines.
2468. Marcus Davis, of Cloudesley-square, Islington—Improvements in the treatment of fibrous materials, other than flax and hemp. (A communication.)
2470. George Gower Woodward, of Lesswels, near Kidderminster—Improvements in the manufacture of carpets.
2481. James Thomas George Vizetelly, of Peterborough court—Improvements in producing plates for printing purposes, by which the manipulatory process of engraving is superseded. (Partly a communication.)
2482. Amédee François Rémond, of Birmingham—Improvements in the manufacture of certain kinds of metallic vessels.
2487. William Vaughan, of Stockport; John Scattergood, of Heaton Norris; and Charles Grimshaw, of Brinnington—Improvements in healds, or harness, or weaving, and in the method of, and machinery or apparatus for, fabricating the same.
2498. John Walker Wilkins, of Ludgate Hill—Improvements in obtaining power by electro-magnetism.
2660. James Bristow, of Bouverie street, and Henry Attwood, of Holland street, Blackfriars road—Improved mode of constructing marine boilers.
2946. Robert Whewell, of Little Belton—Improvements in machines used for cutting paper.
28. Alfred Vincent Newton, of Chancery lane—Improved machinery for crushing or grinding, and washing and amalgamating quartz, rock, or other substances. (A communication.)
180. William Massey, of Bootle-cum-Linacre, near Liverpool—Improvements in artificial teeth and gums.
228. John Henry Johnson, of Lincoln's inn fields—Improvements in the manufacture or production of gas, and in the application of the materials employed therein. (A communication.)
234. Luther Young, of Bow lane, Cheapside, and Edwin Marten, of Louisa street, Stepney—Improvements in apparatus for regulating the pressure and supply of gas.
262. Henry Watson, of High Bridge, Newcastle-on-Tyne—Improvements in the working of brass and copper into forms, and planishing them.
274. Edward Howard, and David Porter Davis, of Massachusetts—Improvements in machinery for sewing cloth or other material. (A communication.)
388. Moses Poole, of Avenue road, Regent's park—Improvements in boiler furnaces and other furnaces. (A communication.)
416. Ernst Gessner, of Aue, near Schneeburg, Saxony—Improvements in gig mills.
452. Edward Hammond Bentall, of Heybridge—Improvements in ploughs or implements for cultivating land.
466. John Elder, of Glasgow—Improvements in marine steam engines.

Journal of the Society of Arts.

FRIDAY, MAY 5, 1854.

EDUCATIONAL EXHIBITION.

The following gentlemen have consented to serve on this Committee since the publication of the last week's number:—

Bazley, Thomas, President of the Manchester Chamber of Commerce
Babbage, Charles, F.R.S.
Coleridge, Rev. Derwent, M.A., Principal of St. Mark's College, Chelsea
Cumming, James, LL.D., H.M. Inspector of Schools
D'Oyley, Rev. J.
Fisher, Rev. George, M.A., F.R.S., Chaplain to the Educational Department, Greenwich Hospital
French, Rev. R. C., A.M.
Heldenmaier, Professor B., Pestalozzian School, Worksop
Hawkins, B. Waterhouse
Perry, Sir Erskine
Riddle, John, Head Master of the Nautical School, Greenwich
Roche, Mons. A.
Solly, Professor Edward, F.R.S.
Sopwith, Thomas, F.R.S.
Sykes, Lieut.-Col. W. H., F.R.S.

The following are the rules which have been settled by the Committee for the conduct of the Exhibition:—

Applications for space must be made *forthwith* to the Secretary of the Society of Arts, Adelphi, London.

Exhibitors will be requested to deliver their objects, at their own charge and risk, addressed to Mr. Dodd, Superintendent, St. Martin's Hall, Long Acre, London; not later than Saturday the 10th of June next.

No charge will be made for space, or such ordinary fittings as will be provided by the Society. Special fittings, such as glass cases, stands, &c., must be provided by the Exhibitors themselves.

Articles sent for Exhibition should be priced, and the terms on which they can be supplied to Schools should be stated.

Articles sent for Exhibition should be accompanied by sufficient explanatory information as to their use; and those from foreign countries should also be accompanied, as far as possible, by an account of the system of instruction under which they are used.

Should any Exhibitor desire to employ an attendant of his own to preserve or keep in order the articles he exhibits, or to explain them to visitors, he may do so after obtaining permission from the Committee, which will be granted if his collection appear to the Committee to justify such privilege.

Full power of rejection and selection are reserved to a Sub-Committee, subject only to an appeal to the General Committee.

The Committee reserve to themselves the right of directing the arrangement of all goods that may be sent in such a manner as they may think proper.

In reference to books and maps, each Exhibitor must send two copies; one to be shown on the Exhibitor's own stall, and the other to be placed according to the classification adopted by the Sub-Committee.

CLASSIFIED LIST OF OBJECTS,

WHICH MAY BE ADMITTED.

Section I.—Buildings.
Section II.—Fittings and Furniture.
Section III.—Apparatus and Materials.
Section IV.—Books, Maps, Prints, and Diagrams.
Section V.—Results.
Section VI.—Objects, or Models and Drawings of Projects, for supplying Desiderata.

SECTION I.—Buildings.

Plans, Models, Drawings, Photographs and Descriptions of complete sets or portions of Buildings with their appurtenances, for Educational purposes, however designated as

1. Schools, Elementary, for
   Boys, Girls, Infants, Mixed } For Towns or Villages.
   Superior.
   Training.
   Industrial and Trade.
   Ragged.
   Reformatory.
2. Schools for the Blind.
   Deaf and Dumb.
   Infirm in Health or Intellect.
3. Mechanics' Institutes, Lecture Rooms, Libraries, &c.
4. Establishments for the especial teaching of
   Drawing.
   Practical Science.
   Agriculture.
   Chemistry.
   Mining.
   Naval or Military Science and Practice, &c.

Plans, Models, Drawings, Photographs and Descriptions of portions of Buildings or their appurtenances, such as

School rooms.—Dormitories.—Lavatories.—Lecture-rooms.
Dining-halls.—Kitchens.
Teachers' Houses.
Playgrounds and Gymnastic Apparatus.
Closets and Urinals.
Baths.

Exhibitors are requested to explain in detail the modes of warming, ventilating, draining and lighting the above buildings.

SECTION II.—Fittings and Furniture.

Plans or Models of the various Fittings and Articles of Furniture required for the accommodation of teachers and their pupils or other auditors, such as

Seats.—Desks.—Teachers' Desks.—Writing Tables.—Work Tables.
Galleries.
Curtains.
School-boxes.
Clocks.
Bells and Whistles.
Stoves.

Models, Plans, or Photographic views of the interiors of School-rooms or Lecture-rooms, to show the application of fittings or their arrangements, or any other particulars relating to the convenient disposition of the pupils and teachers.

Ornaments for Schools, as Figures, Casts, &c.

SECTION III.—Apparatus and Materials.

Specimens or Samples of Materials, and Apparatus or Drawings of Apparatus, of a cheap and simple description, applicable to the teaching or practice of the subjects undermentioned; distinguishing them, if necessary, as intended for the use of Schools with limited funds, or of Superior Schools.

Writing, Arithmetic, Drawing, Music, Needlework, etc.

Drawing Models, Casts and Examples.
Drawing Boards.
Black Boards, Pointers and Crayon Compasses, for ditto.

Easel Frames or other supports for Drawing Boards.
Means for suspending Diagrams and Drawings.
School Registers and Time-tables.
Furnished Cases for Object Lessons.
Slates and Slate Pencils.
Pens and Penwipers.
Ink.—Inkstands and Inkwells.
Rulers.
Copy Books.
Sets of Books for Book-keeping.
Work-boxes and fittings.
Engraved or printed Patterns for Needlework, Embroidery, &c.
Dolls for dressing.
Drawing Paper.
Pencils and Pencilcases.
India-rubber.
Chalk-Crayons, and Port-Crayons.
Sets of materials for Drawing Classes.
Sets of Drawing Instruments.
Cheap sets of ditto.
Specimens of the sets arranged for the especial practice of certain Naval, Military and Surveying Schools, and Colleges.
Drawing Instruments, separate, as
Compasses, Drawing-pens, Scales, Protractors, &c.

APPARATUS FOR INFANT SCHOOLS, AS
Cheap Toys and Games calculated to improve the eye, and the Arithmetical and other Powers.

MUSIC.
Appliances for facilitating the Teaching of Choral Singing, and Instrumental Music in Schools, as
Printed Diagrams.
Pitch Pipes and Tuning Forks.
Musical Instruments of a price suitable for the use of Schools.
Music Books, Music Paper and Music Cards.

PRACTICAL SCIENCES.—Apparatus for the Teaching of; distinguished as belonging to one of the two following sections:
Simple forms of Apparatus suitable for teaching at a moderate outlay in Elementary Schools.
More complete forms of the same, for superior Schools and Colleges.
Scales and Weights.
Measuring Rules and Tapes.
Sets of Mechanical Powers.
Atwood's Machine and other contrivances for the elucidation of Mechanical principles; and of Hydraulics and Pneumatics.
Models, Sectional Models, Moveable Diagrams and other devices for the explanation of Machinery and the parts of Machines, Steam-Engines, Water-Wheels, Pumps, &c.
Simple Instruments for Meteorological Observations, Barometers, Thermometers, Anemometers, Ozonometers, Rain-Gauges, &c.
Globes.
Elementary Optical Apparatus.
Simple Microscopes.
Plain Telescopes.
Electric, Galvanic, Magnetic, Electro-Magnetic and Electrotype Apparatus.
Levelling and Surveying Instruments for teaching the principles and practice of Surveying.
Scientific Toys, as Magic Lanterns, &c.
Simple Photographic Apparatus and Materials.
Simple Astronomical and Nautical Instruments.
Simple and inexpensive Printing and Lithographic Presses, with the necessary materials for practice.
Architectural Models.
Simple Apparatus intended for the Teaching and Practice of Chemistry in Schools.
Apparatus for the Teaching and Practice of Cookery, Washing, and the general getting up of Linen in Schools.
Carpenters' and other Tools, and Implements of Horticulture suited to the use of Boys.

NATURAL HISTORY.—Collections for Teaching Elementary Mineralogy, Geology, Zoology, Botany, Horticulture, &c.

SECTION IV.—BOOKS, MAPS, PRINTS AND DIAGRAMS.

BOOKS.
Books adapted for the use of Scholars in Elementary Schools: as
English Spelling Books.
English Grammars.
English Dictionaries.
Historical Text Books and Reading Books.
Other Works on the English Language adapted to School use.
Geographical Text Books and Reading Books.
Text Books of Arithmetic, Algebra, Bookkeeping, Geometry, Mensuration, Trigonometry, &c.
Series of Reading Books.
Poetical Selections.
Text Books and Reading Books on Experimental Science and Natural History, &c., &c.
Books on any branches of Domestic Economy adapted for School Girls.
Books on Games and Gymnastics.
Books for teaching French and German.
Books on the same range of subjects fit for the use of Schoolmasters and Teachers, as,
Gazetteers.
Biographical and Historical Dictionaries, and other Books of Reference.
Cheap Cyclopædias.
Works on the Art of Teaching, on Schools and School Management, and on Educational Statistics.
Books for the Blind.

MAPS AND ATLASES.
Wall Maps for teaching—
General Geography.
Physical Geography.
Historical Geography.
Small Maps for the use of Schoolboys.
Maps for the use of Schoolmasters and Pupil Teachers.
County Maps.
Atlases for—
General Geography.
Physicial Geography.
Historical Geography.
Relief Maps.

PRINTS AND DIAGRAMS.
Prints and Sheet Lessons.
Sheet Lessons for Reading and Spelling.
Sheet Tables of all kinds.
School Prints, plain and coloured, in sets, relating to—
Sacred History.
Profane History.
Natural History, Anatomy, and Physiology.
Representations of Cities, Towns, &c.
" of Manufacturing Processes.
Ethnology.
Decorative and Fine Arts.
Diagrams for the use of Teachers and Lecturers in Arithmetic, Astronomy, Botany, Chemistry, Drawing, Geography, Music, Mechanics, Natural History, Physiology, &c., &c.

Note—No Book on any subject will be exhibited which is not considered to be especially fit for the use of Schools.

No elementary Works for teaching Ancient or Foreign Languages will be exhibited, except German and French.

Religious Books will be received only through the medium of recognized Societies, and will be placed in their Collections.

SECTION V. RESULTS.

Specimens from Schools, of Drawing and Colouring.
Needlework.
Printing.

Work done by the Blind.
Wax Fruit.
Artificial Flowers in Paper, Linen, Wax, &c.
Embroidery and Crochet.
Lacework.
Plaiting.
Modelling in different materials.
Dolls dressed.
Other industrial Work.
Writing and Ciphering.
Mapping.
Book-keeping, &c., &c.

SECTION VI. OBJECTS, OR MODELS AND DRAWINGS OF PROJECTS FOR SUPPLYING DESIDERATA.

Moveable Partitions.
Musical Instruments, as Pianofortes, Harmoniums, or new inventions of the same class, adapted for School use.
Work-books.
Materials for, and modes of suspending, Curtains.
Contrivances for drying Cloaks, &c.
Gymnastic Apparatus.
Lining for Walls.
Flooring for Playgrounds.
Means for preventing Echo.
Improved and Inexpensive stoves.
Instructive Ornaments, such as Ward's cases for Plants, Vivariums, &c.
Geographical Prints.
Fine Art prints on subjects suitable for Schools.
Prints of Manufacturing processes.

Note.—Articles not specified in the foregoing list, but which appear to the Committee of Selection to be of interest, may be admitted. By order,

P. LE NEVE FOSTER, *Secretary.*

The following letter and copies of despatches have been received from the Foreign Office in reference to this Exhibition:—

Foreign Office, April 25th, 1854.

SIR,—With reference to Mr. Addington's letter of the 30th ultimo, inclosing a copy of a note from the French Minister for Foreign Affairs upon the subject of the Educational Exhibition proposed to be held in London, I am directed by the Earl of Clarendon to transmit to you, for the information of the Council of the Society of Arts, a copy of a despatch from Lord Cowley, Her Majesty's Ambassador at Paris, inclosing a copy of a further note from M. Drouyn de L'Huys, together with several documents relating to public education in France.

I am, sir, your most obedient, humble servant,

E. HAMMOND.

P. Le Neve Foster, Esq.

Paris, April 17th, 1854.

MY LORD,—With reference to your lordship's despatch, No. 70, of the 6th of February last, forwarding to me a copy of a letter from the Society of Arts, respecting an Educational Exhibition to be held in London in June next, I have the honour to inclose herewith a copy of a note, together with its inclosures in original, which I have received from M. Drouyn de L'Huys in reply to my application to His Excellency for the co-operation of the French government, and for information respecting the state of education in France.

I have,
(Signed) COWLEY.

Lord Clarendon.

Paris, le 11 Avril, 1854.

M. L'AMBASSADEUR,—Ainsi que j'ai eu l'honneur d'en informer V. E. le 15 de ce mois dernier, je m'étais empressé de demander à M. le Ministre de l'Instruction Publique, les renseignemens et documens relatifs à l'instruction publique en France que V. E. m'avait exprimé le désir de recevoir pour la Société Britannique des Arts.

M. Fortoul vient en conséquence de m'envoyer la collection de tous les réglemens qui ont modifié l'ancienne legislation universitoire et qui régissent aujourd'hui l'Instruction Publique en France. J'ai l'honneur, M. l'Ambassadeur, de mettre ces documens à la disposition de V. E. La Société des Arts y trouvera les bases nouvelles du système d'instruction établi dans les diverses écoles de l'état depuis le 2 Décembre, 1851.

Quant aux objets et instrumens classiques que cette Société attacherait également du prix à recevoir pour l'exposition qu'elle prepare à Londres, j'aurais desiré pouvoir satisfaire au vœu que contient à cet égard la lettre dont V. E. a bien voulu me donner communi. Mais le Ministre de l'Instruction Publique ne possède point de collection d'objets de ce genre, les differens articles dont l'emploi a lieu dans les classes des écoles reconnues par l'état étant laissés, à l'exception des livres, à l'appréciation des maîtres et professeurs de ces établissemens.

Agréez,
(Signé) DROUYN DE L'HUYS.

Lord Cowley.

INSTITUTE BOOK ORDERS.

APRIL ACCOUNT.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Annan, Mechanics' Institute	11	13	5	8	13	7
Banbury, Mechanics' Institution	6	16	6	5	4	4
Barnsley, Mechanics' Institute	6	8	6	4	16	4
Bristol, Athenæum	4	1	0	3	3	1
Cambridge, Mechanics' Institute	3	19	0	3	0	6
East Retford, Literary and Scientific Institution	1	17	1½	1	9	9
Gateshead, Mechanics' Institute	2	16	1	2	5	3
Highworth, Literary and Scientific Institution	4	6	6	3	6	11
London, Bank of England Library and Literary Association	1	7	6	0	19	1
Louth, Mechanics' Institution	7	6	6	5	2	8
Oldham, Lyceum	6	15	0	4	7	6
Sevenoaks, Literary Institution	10	17	11	8	4	8
Shaftesbury, Literary Institution	1	18	0	1	9	7
Sheerness, Isle of Sheppy Mechanics' Institution	0	6	2	0	4	7
Stamford, Institution	0	19	0½	0	15	7
Welshpool, Reading Society	0	12	0	0	6	4
Whitehaven, Mechanics' Institution	6	16	8	5	0	11
Worksop, Reading Room	4	13	6	3	9	5
York, Institute	2	9	6	1	16	5
	£85	19	11	£63	16	6

Shewing a total saving of £22 3s. 5d., or an average discount of about 25 per cent.

TWENTIETH ORDINARY MEETING.

WEDNESDAY, MAY 3, 1854.

The Twentieth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 3rd instant, the Rev. Dr. BOOTH, F.R.S., in the chair.

The following candidates were balloted for and duly elected Members:—

Rawden, Rev. G. C., D.C.L. | Scott, Thomas

Previous to the reading of the paper, the Secretary called attention to an apparatus invented by Mr. Wrey, a member of the Society, for communicating between the guards and drivers of railway trains. It consisted of a series of pairs of bell-cranks attached to each carriage, with an expanding connection between from one to the other. By these means the catch of a spring was released, and a bell affixed to the engine, or other part of the train, was rung. A model of a machine for pulverizing sugar, gum, and other substances, which cannot easily be ground without clogging, was also exhibited. This machine is the invention of Mr. Chase, Boston, U.S., and will be found described in No. 74 of this Journal, page 393.

The Paper read was

ON THE DECIMALIZATION OF COINS AND ACCOUNTS.

By William Miller, Cashier, Bank of England.

Having been honoured by a request from the Council of this Society to write a paper upon the Decimalization of Coins and Accounts, illustrating practically the benefits of such a change, by shewing examples, I have prepared what is here written.

I was in a great measure ignorant, at the time I engaged to do this, of what had already been written, and this must be my apology. It was not my good fortune to hear the valuable paper of Professor Jack read to this Society. I was not aware of the existence of the excellent treatise upon this subject written by Sir Charles Pasley in 1834—a work I have since read—which enters into a laborious and detailed examination of the present weights, measures, and money system, and proves beyond a doubt the advantages that would attend the change to the decimal system. This book has been, in fact, the source from which a great deal of the information contained in the many pamphlets written upon the subject has been drawn. There is also a valuable little treatise by Mr. Henry Taylor; and there has just now appeared another book, by Sir John Bowring, containing 245 closely-written pages, of greatly interesting and very curious matter. Had I been aware of all these, I should have considered a paper of this kind from me quite superfluous, and not a little presumptuous. As it is, I have had much to do both with coins and accounts, and have a strong conviction of the advantages that would attend their decimalization; and if in the discussion which may ensue from this paper, any new reason in favour of a change, or any new means by which such change might be brought about, should be elicited, our evening will not be wasted, and I shall feel in some degree justified.

Most persons entering upon this question start with the magnificent idea of a universal system of weights, measures, and money; but as they proceed, in the honest endeavour to carry out so great a good, in their way towards the practicable, they encounter unforeseen difficulties, which increase as they advance, till, growing weary they discover that they have taken up too large a burthen. First, they abandon their universal notions; then their general notions; until at last they arrive at the practicable goal, with their faith unshaken, it is true, but, of all their original burthen, only a few modest propositions for the commencement of a decimal currency, or a small initiatory change in the weights and measures.

I do not, therefore, propose to lay before you any system of weights and measures. I think we have not even yet sufficiently examined that large and intricate subject—either our own weights and measures, in reference to our own requirements, or in reference to the weights and measures of other countries, to be able to say that a certain system is the best, under all circumstances, that we ourselves could adopt, or the best suited to the uses of all mankind.

Those who would drill all nations into like habits and ways, in a desire for universal perfection, often overlook the difference in the conditions of various parts of the earth, and the variety of means necessary to enable man to adapt himself to those conditions.

A variety of measures may possibly be amongst those means, seeing how great is the variety of those in existence.

While, therefore, the problem is in course of solution as to what is best universally, or best for us in particular, let us, at all events, make the best use of that which we have.

With this view I propose briefly to show

1st. The inconvenience of the present irregular notation, and the convenience of the decimal system.

2ndly. How far we can apply the decimal system of notation to our present weights, for I must throw over the measures.

3rdly. How we can completely decimalize our coins and accounts, without so greatly interfering with present habits as to produce confusion; so as gradually to prepare the public to receive, as a great boon, a complete system of weights and measures, when such should be thoroughly mature.

Purchase of Gold.

The two points involved in the first proposition I must consider together, as the same examples serve to illustrate both.

The decimal system of notation, I cannot help thinking, is a natural system, and that it has its basis in the constitution of man.

It has its first symbols and exponents in his ten fingers; but the principle I take to be inherent in his mind and its organism.

I believe it to be the natural method of manifestation of the attribute of number, in proceeding from one to many—from the known to the unknown—to note the progress by tens.

This mode is universal—has arisen spontaneously in nations widely separated, and, as far as history can throw her light, she reveals its existence.

Upon this notation the arithmetical system is based; but before we can apply its rules with our unequal weights, measures and money, none of which progress from the smallest to the largest by decimal gradations, nor even by regular gradations, nor by the same irregular gradations in each, before, I say, we can apply its rules, we must bring all the terms of the question to be solved into harmony with it. We must convert all unequal quantities into their common elements, enumerated decimally; or we must reduce all the subordinate quantities into decimal fractions of the largest.

These are our difficulties, and I cannot better illustrate them than by showing what a person, possessing an ordinary knowledge of arithmetic, would have to undergo in estimating the value of a bar of gold at the mint price of £3 17s. 10½d. per ounce troy, supposing the whole of the working to be recorded.

He must have his bar properly melted, to be sure that it is of one quality throughout.

It must then be assayed. The assayer will report its quality in relation to standard gold, as so many carats, so many grains of carats, and so many eighths of grains of carats, better or worse than standard gold.

A carat is the 24th part of any quantity of gold.

A grain (which has nothing to do with the grain of weight) is one-fourth of a carat.

And each grain is divided into 8 parts.

Standard gold contains 22 parts or carats of fine gold, and two parts of alloy.

When the quality of a bar of gold has been ascertained, the next question is, what its weight would be, supposing it were converted into standard by the addition or elimina-

tion of alloy. Suppose, for instance, the assay report be "2 carats better" than standard, it would mean that the bar was fine gold. To bring the mass to standard gold, it would be necessary to add, to every 22 elements of its weight, two elements of alloy.

The statement, therefore, of the question as to the amount of standard gold in a mass of gold better than standard, would be:—

As 22 : 22 + {the rate better} : : Actual weight : the Standard weight

The question is simple enough, but the working is very tedious, on account of the incongruity of the terms.

First, we have the weight in pounds, ounces, pennyweights, and grains; we have next, the quality in carats, grains, and eighths of grains; and lastly, we have the money in pounds, shillings, pence, and farthings.

None of these terms will work together arithmetically; they have, consequently, to be reduced into their lowest elements.

Example 1st.

Required the value of a bar of gold weighing 79lbs. 7oz. 17dwts. 12grs., reported by the Assayer to be 5 carats, 3 grains, and 7-8ths worse, and its weight in standard.

By the converse of the previous statement, the gold being worse,

```
Carats. Carats.  Carats. Grains.   lbs. oz. dwts. grains.
As 22  : 22   —    5      3⅞  : : 79   7   17    12 :
    4     5 . 3⅞ deduct            12
   ---   -------                  ----
   88    16 . 0⅛                  955
    8     4                        20
   ---   ---                     ------
   704   64                      19.117
          8                          24
         ---                     ------
         513                     76.480
                                382.34
                                -------
                                458.820
                                    513
                               ---------
                               1.376.460
                               4.588.20
                              229.410.0
                             -----------
                          704)235.374.660(334.339 Answer in
                              2212                 grains*
                              ----
                              2417
                              2112
                              ----
                               3054
                               2816
                               ----
            *                  2386
   ⎧ 3 )334.339                2112
24 ⎨ × ---------               ----
   ⎩ 8 )111.446.1               2746
       ---------                2112
  2,0) 1393.0.19                ----
      -----------               6340
  12)  696.10.19                6336
Standard Gold lb. 58. 0.10.19   ----
                                   4
```

[*This Example is continued in the next column.*]

This operation gives the answer in grains, which have to be converted into pounds, ounces, and pennyweights.

We have now the weight in standard gold, and now comes the question of value at the mint price of £3 17s. 10½d. ℔ ounce.

The Bank of England have, however, discontinued the use of the troy pound, the pennyweight, and the grain, retaining only the ounce, and using multiples and decimals of the ounce. They have prevailed upon the dealers in bullion to do the same. Her Majesty's Mint also conforms, and an Act of Parliament ratifies the change. By this change our friend with the bar would have his labours much shortened; for not only is the weight recorded with greater minuteness, but in less figures, and the reduction is avoided.

Example 1st—*Continued.*

```
Ounce.   Grains.      £.  s.  d.        Answer.
As 1  :  334.339  : :  3 . 17  10½  :  £2712 3s.
  20                  20
  --                  --
  20                  77
  24                  12
 ----                ----
  80                  934
 40                     4
 ----                ----
 480                 3738
                   334339
                   ------
                    33642
                   11214
                  11214
                 14592
                11214
               11214
              -------------- Farthings
          480)1249759182(4)2603664
              960           -------
              ----        12)650916
              2897         --------
              2880     2,0) 5424,3
              ----         --------
               1759     £2712 3s. — Value
               1440
               ----
                3191
                2880
                ----
                 3118
                 2880
                 ----
                  2382
                  1920
                  ----
                    46
```

Example 2nd. Present System.

What is the standard weight of a bar of gold weighing 955,875 ounces, at 5 carats 3⅞ grains worse, and what is its value?

```
As 22  :  22  —  5.3⅞  : :  955,875
    4      5.3⅞                 513
   ---    ----             ---------
   88     16.0⅛             2867625
    8      4                 955875
   ---    ---               4779375
   704    64               ----------
           8          704)490363875(696.539 419/704
          ---             4224         [answer in ounces.
          513             ----
                          6796
                          6336
                          ----
                           4603
                           4224
                           ----
                            3798
                            3520
                            ----
                             2787
                             2112
                             ----
                              6755
                              6336
                              ----
                               419
```

Value at £3 17s. 10½d. by practice:—

s.	d.			
				696.540
				3
15	0	= 1-4th	. . .	2089.620
2	6	= 1-6th	. . .	522.405
0	3	= 1-10th	. . .	87.067
0	1½	= 1-ha'f	. . .	8.706
				4.353
		Answer	. . .	£2712.151
				20
				3.020

This is the whole working, and I wish particularly to direct your attention to the effect of this alteration, because it has been made with great ease and with little expense, and the principle might be extended, as we shall see hereafter.

EXAMPLE 3RD.

The following is the operation, supposing all the elements of the calculation were in decimals, and that standard gold consisted of 9-10ths fine gold, which would make the Mint price £3 16s. 5½d., or, expressed as it would be in decimals, £3.823 mils. The question would, therefore, have to be asked in somewhat d fferent terms, namely,

What would a bar of gold, weighing 955.875 ounces, reported by the assayer as 667.96 fine, yield in ounces standard, and what would be its value?

According to the previous formula—

As 900 : 667.96 :: 955.875
69.766 Assay reversed

5735.250
573.525
66.910
8.602
573

900)6.384.860

709.430 Ounces standard
3.283 Price per ounce reversed

2128.290
567.544
14.188
2.128

£2712.150 Value as before.

Nothing could be more simple than the last working, and were the supposed changes really made, as they very easily might be, it would be shortened still more, because the quality would never be reported to five figures.

The other example I propose to take from the practice of the Custom-house.

Suppose we take currants.

What is the duty upon 3 butts of currants weighing as follows?

	Cwt.	qrs.	lbs.		lbs.
No. 1.	18	2	16	=	2088
2.	20	3	14	=	2338
3.	19	3	14	=	2226
Gross weight	59	1	16	=	6652

The duty to be charged is £1 2s. 2d. per cwt., and 5 per cent. added.

The first operation is to take off the tare, or the weight of the package or barrel, the duty being charged upon the net weight; that allowance being upon butts from 14 to 18 per cent., say 14 per cwt.

The Custom-house rule is to "multiply the cwts. by the tare per cent, and the product will be the tare on the same in pounds; then reduce the odd quarters and pounds into pounds, and multiply the same per cwt. tare, and divide by 112, which will give the tare on the pounds, and the two added together will be the tare on the whole."

Cwt. qrs. lbs.	Odd Weight. qrs. lbs.
59 1 16 gross wt.	1 16
Tare 14	28
236	44
59	14
826 Tare on the cwts.	176
6 Do. „ odd weight	44
112)832(7 cwt.	112)616(5
784	560
28) 48(1 qr.	56=1
28	-
	6
20—lbs.	-

The tare is, therefore, 7 cwt., 1 qr., 20lbs., to be deducted from the gross weight.

	Gross weight. cwt.	qr.	lbs.	
	59	1	16	
	7	1	20 tare	

cwt. Duty per cwt. First duty.
Then, as 1 : cwt. 51 3 24 : : £1 2 2 : £57 11 10

112 4
207
28
1660
416
5820
266
34920
34920
11640
d.
112) 1648120 (12) 13822
112
2,0) 115,1 . 10
428
336
£57 11 10—First duty.
921
896
252
224
280
224
56

Then 5 per cent. upon the first duty.

d.
13822
5 per cent.

12) 691,10

2,0) 5,7 . 7

2 17 7—Extra duty 5 per cent.
57 11 10—Add first duty.

£60 9 5—Total duty.

Keeping the accounts in pounds, and taring by a per

centage, and reducing the duty also to a per centage, which would be the simplest thing in the world, the whole of the foregoing elaborate calculation would stand thus:

	lbs.		lbs.		lbs.		lbs. Tare
To find the Tare—As	100	:	6652	::	12·5	:	831.5

12·5 = ⅛ = 831·5

[duty

„ the Duty—As 100 lb. : Nett 5820·5 : : 1·039*l.* : 60.474*l.*

930·1

5820·5
174·6
52·3

£60,474 = £60 9 5

No remark need be made upon this statement; it speaks for itself.

I might go into every trade, every profession, and all through our commercial system, and multiply examples of this kind without end; shewing the same disadvantage in the one system, the same advantages in the other. I might quote from the expressed opinions of some of the greatest men in the scientific world; of some of the greatest merchants; of some of the most extensive retail traders; all to the same purpose; but I could hardly make a fair selection where the testimony is equally valuable, and we have not time to do it justice.

I would, however, refer you to the reports of the Commissioners on weights and measures, to the evidence taken before the Committee of the House of Commons; to the report of that Committee; and to the books I have previously referred to.

The evidence is most abundant and overwhelming, and all in favour of a decimal system of money, weights and measures.

There remains one point with which this part of the subject is connected, which must not be passed over. It is that of education, and upon this I would quote the words of one who is most justly entitled to the first hearing.

Professor de Morgan says: "Has any of our readers ever taken the pains to form an idea how much of the time actually spent in education in Great Britain and Ireland, is spent in overcoming this disadvantage of our present system of coinage?

"We say coinage, because by far the greater part of practice in commercial arithmetic is devoted to pounds, shillings, and pence. We believe that 5 per cent. is under the mark, taking in all classes. We believe that in purely commercial schools it is a great deal more; but that in all together, from Oxford and Cambridge down to the lowest village school, more than 5 per cent., more than one-twentieth of the whole time passed in every kind of learning and practising, is lost by having two systems of arithmetic to learn the common decimal and the monetary. We put down arithmetic—looking at the mass of places in which only reading, writing, and cyphering are taught —as more than 20 per cent. (we cannot say how much more) of the whole; and we estimate the dead loss of time which arises out of our money system as one quarter, at least, of that 20 per cent.

"We speak of time only: were we to compare what is done—as to efficiency, as to sound result produced—we should say much more.

"It would be well to abolish the system of teaching, even though it saved nothing in teaching: and besides this, we turn every 97 hours of useful schoolwork into 100.

"Add to this the relief given by the abolition of the worst part of the drudgery of learning computation, which lies in this, that there is a lower deep beneath the lowest. As soon as the unfortunate student has mastered the four rules, there is a weary recommencement of his toil."

Hear another great teacher, in a higher school. We may imagine him engaged in a wise and learned consideration of the sublimest mysteries of the universe, and brought down to earth, and vexed in the effort, to use his own words, "of disencumbering the elements of computation of the infinite complexity of denominations under which they are now presented."

I mean Sir John Herschel, who observes in regard to the bearing of this question on education, "I should say that, the decimal system being once introduced, the rules of 'Compound Arithmetic,' 'Reduction,' and 'Practice,' would no longer require to be taught in the schools.

"The relief thus afforded, both to the teacher and scholar, would be immense. The four essential rules of arithmetic would be better acquired and the drudgery spared, and the time saved for the acquisition of real knowledge would tell upon the education of every individual in every class of society."

I think from these considerations we may take the first compound proposition, namely, the inconvenience of the present system, and the great advantage that would attend a decimal system, as admitted.

Having established this ground-work, I shall proceed to consider next,

How far we can apply the decimal system of notation to our present weights, and that without greatly disturbing existing habits and modes, or entailing much expense upon the trading part of the community.

I have before observed that I do not think we have sufficient evidence upon this subject yet, to be able to say what might be done with our weights and measures, so as to leave us a decimal system, which we need not feel ashamed to compare with the French, or any other system, for the convenience of its units, for that is a most important point; but something we might do, which would enable us, at least in regard to weight, the most important, to employ the decimal notation.

We might do with the pound avoirdupoise, what the Bank of England has done with the troy ounce; that is to say, abolish the old multiples of the pound, the quarters, hundred weights, and tons, on the one hand, and the old divisions, the ounce, dram, &c., on the other, and have only decimal multiples, and decimal fractions of the pound.

We should then have only two weights, the present avoirdupoise pound and the troy ounce. The one used as it has been all through our history as the commercial weight, the other as the money and drug weight.

Why I think we cannot abolish the troy ounce, is, that we should have to alter the whole literature of medicine; and if it be kept for medicine, I see no particular reason why it should not continue to be employed as heretofore in the traffic in the precious metals.

Why I wish particularly to preserve our pound weight as a unit, is, that it is very near the weight which experience has led most nations to adopt for commercial purposes.

It is the weight of all the German nations, and has been so from time immemorial.

There is an unaccountable disagreement amongst authors, as to the history of this weight; but in the remains of Anglo-Saxon writers, and in the Anglo Saxon laws which have desended to us, it seems to me to be very plain.

This history of the pound of weight is so intimately connected with that of our money, those time-honoured names pounds, shillings, and pence, that it is impossible to separate the two. We must, therefore, although we anticipate the money part of our subject, consider both together up to the Norman conquest, when an adjustment of the money to the Norman system, which was the Roman system, in fact, took place, and the troy pound, and the pound tower came to be used.

In the early divisions of the Saxon pound the ounce was not known.

This pound was based upon the average weight of grains of wheat, and might at any time be made up in

the same way sufficiently near for ordinary commercial purposes.

Thirty-two corns of wheat taken out of the middle of the ear were considered equal to a pennyweight of 24 grains; 5 of these pennyweights made a shilling, and 60 shillings made a pound of 7200 grains. The pound of money was made up in precisely the same way. It was a pound of silver of the quality of 222 parts fine silver and 18 parts of alloy. That was the standard of old England, and is the standard at this day.

Thus the pound was not a coin, but 7200 grains of standard silver. Neither was the shilling a coin, but 120 grains of silver cut off from a bar of a certain size and form. The penny was a coin of the value, by law, of 1-5th of that shilling, or 24 grains of uncoined silver, although its real weight was only 22½ grains; the farthing was 1-4th, as its name implies, of a penny, and represented 6 grains of uncoined silver, its actual weight being 5⅝ grains.

The following, therefore, was the system of weights:

Grains							
24	=	Pennyweight					
120	=	5	=	Shilling			
7200	=	300	=	60	=	Pound	

By coining an additional value is given to the precious metals, inasmuch as the impression affords an evidence of the quality and weight of the coin. These coined Saxon pennies, therefore, of the weight of 22½ grains, were of the full value of 24 grains, and 300 of them fully worth the weight of 320 of them in uncoined silver.

Thus there were two different ways of making up the pound, according to the penny value in uncoined silver, and according to the actual weight of the coined penny, or Esterling, as it was called. The former mode has been shown; the mode, according to the actual weight, is as follows:

Grains						
22½	=	Penny				
212½	=	5	=	Shilling		
7200	=	320	=	64	=	Pound

When the Danes came over here an alteration took place; amongst other innovations they introduced the mark and the ora. The mark was half a pound, 3,600 grains; the ora was 20 pennies or 20 pennyweights; the former the money ora, the latter the commercial ora.

The two pounds of weight and of money were then made up as follows:

Grains								
24	=	Pennywt.						
480	=	20	=	Ora				
7200	=	300	=	15	=	Pound		

Grains						
22½	=	Penny				
450	=	20	=	Ora		
7200	=	320	=	16	=	Pound

So it went on till the 10th century, when our intercourse with the Normans increased, and the troy pound used in France as a money weight began to be used in our intercourse with them. This pound was exactly 1-5th lighter than the Saxon pound, and at the Conquest, William abolished the old pound as a money pound, and ordained that the shilling should no longer consist of five pence, but of four pence Saxon.

This troy pound was made up as a money pound in two ways, that is to say, according to the Saxon shilling, and according to the Norman shilling.

Thus of the old Saxon money 4 pennies, of 24 grains each, made one shilling of 96 grains; and 60 of these shillings made the pound of 5,760 grains.

Again, the Norman way, 12 pennies, of the money value of 24 grains each, made an Anglo-Norman shilling of 288 grains; and 20 shillings made up the pound of 5,760 grains.

Anglo-Saxon mode.							Anglo-Norman mode.						
Grains							Grains						
24	=	pennywt.					24	=	Pennywt.				
96	=	4	=	shilling			288	=	12	=	shilling		
5760	=	240	=	60	=	pound	5760	=	240	=	20	=	pound

As a pound of weight, it was constituted as follows:—

Grains						
24	=	pennywt.				
480	=	20	=	Norman ounce, or Saxon commercial ora		
5760	=	240	=	12	=	pound troy

The Norman Sovereigns, at first, continued the penny of the same weight and fineness as the Saxon penny, and hence arose another pound of the weight of 5,400 grains, called the tower pound, used exclusively in their mints. This pound was based upon the actual weight of the penny, namely, 22½ grains; 20 of those pennies made the ounce tower of 450 grains, which was actually equal to the Anglo-Danish money ora, or the eighth part of a mark; and 12 of those ounces made the pound of 5,400 grains.

This was the mint pound down to the time of Henry the Seventh. The merchant delivered to the mint to be coined 5,760 grains troy, and received back its value in coined silver, weighing 5,400 grains, the profit being generally divided between the king and the clergy.

Thus the adjustment of weight and money was made between the Saxon and the Norman people. The pound of money was reduced from 7,200 grains to 5,760; but the penny and the commercial pound remained the same, and the whole thing was fair and intelligible.

From that time nearly to the present, the pound avoidupoise and the pound troy have been in use, bearing the relation to each other of 5 to 4; there being formerly 15 troy ounces to the avoirdupoise pound.

The troy pound is now very little used, except for drugs; and the avoirdupoise pound has been altered from its historical weight, and made, at the recommendation of the Royal Commissioners appointed in 1818, to consist of 7,000 grains only.

I do not see, I must confess, what we have gained by this alteration. I think it is a subject of regret that, when the question was open, the Commissioners did not take advantage of the want of agreement amongst the avoirdupoise standards, to restore the historical pound of 7,200 grains, instead of adopting a weight entirely new, and having no relation whatever to any other weight.

Had they done so, and taken the Cologne mark as their standard, they would have saved themselves a world of trouble, and we might have had a pound almost identical with the money pounds of all the German nations, and, as in all probability the Americans would have taken the same standard, we should have had no small part of the commercial world with us.

However, it is too late to do this, and we must deal with it as it is. I would preserve it, because it is a convenient commercial unit. The advantages of a convenient unit in a decimal system consist in this, that in itself it would be the quantity most required, and its halves and quarters would be its most ordinary fractions, and these would require only two places of decimals; while in a weight twice as large, as in the kilogramme, the same quantities would require three places to express them.

Thus, if we preserved our pound weight as a unit, and chose to decimalize it, the most important of the shopkeepers' weights would remain the same. They would retain their pound, half-pound, and quarter, substituting for their ounce weights, their half ounce, and quarter (for they seldom go below that), 1, 2, 3, and 5 tenths, and 1, 2, 3, and 5 one-hundredths. Those would be all the weights required by them, and the smallest class would be seldom or never used.

Referring to Mr. Kirkman's important evidence, we shall find that poor people purchase commodities in very small quantities; and I have heard it objected that it would be absurd to suppose that they would go and ask

for three-tenths of a commodity, or seven-hundredths, or any such fraction. But I submit that the difficulty would not come to them in that way. A short name would be given to the fractions—say "centlings," for want of a better. A little child would be sent for the old quantity, a quarter of an ounce of tea, for which he would pay three farthings. The shopkeeper would say, "I cannot make that weight now, but I will sell you a centling, which will come to a halfpenny, or two centlings, which will be a penny." In a very short time a child would know what a centling meant, especially a child of that class whose "whetstone of wit" is necessity; and such children in very minute commercial transactions often display an acuteness far beyond their years, and painful to contemplate, because we know the school in which it has been learned.

But the first step to be taken in reforming the weights is one which will not affect in the remotest degree the convenience of the poor. It is not a small question of ounces or pence, become a large one by the number of people affected by it; it is an enormous evil, affecting a smaller number. I mean the question of tons, hundred-weights, quarters, and pounds, to which I have directed your attention in the Custom House example. You have timber in loads and feet, spirits in gallons and gills, or 32nds of gallons, and other absurdities which we will not stop to enumerate.

Now, without waiting for the solution of the question of a decimal division of money, weights, and measures, or no decimal divisions, with regard to these irregular multiples, those of the pound weight at least, I contend that it is the bounden duty of the Government at once to deal. A committee of merchants would so adjust the duties in a few hours to a per centage on the pounds, so as to leave the revenue where it is. An Act of Parliament might then be passed, permissive of the use of decimal multiples of the pound to a certain time, after which no other multiples should be used.

The Customs and Excise all over the realm should immediately set the example of their use; the merchants and wholesale traders would immediately follow their example. The expense to the Government of the change would be fully repaid by a year's saving, and the gain to the country, in the diminution of clerks, would be at least 20,000*l.* a year in the Customs and Excise alone. At the same time the duties would be more pleasant to those that remained.

The strength of spirits is tested by Sykes's hydrometer, which is a decimal scale. Why not keep the record in gallons and decimal parts?

Great progress might be made, step by step, in this way. Such changes, well timed, would create no confusion, no inconvenience to any one; but, on the contrary, a great and immediate good to all parties. Such a policy, well directed, would, in two or three years, put us in a position to deal with the more difficult points of the question with comparative ease.

In the valuable report of the Commissioners for the Restoration of the Standards of Weights and Measures, the change is strongly recommended; but they state that it would cost the Government between £100,000 and £200,000. But why, with the exception of the weights belonging to Government itself, should it cost the Government anything. The change could not affect a needy class, and it would be so beneficial, that with a permissive law and the example of the government, merchants and large traders would make the change voluntarily.

I am convinced that less than one year's saving would repay the Government all the expense it need incur.

We now come to the last part of our subject, the decimalization of the money.

Any alteration in the money of a country is of the utmost importance. Incalculable evils have befallen this country, from time to time, by alterations in its money, made either in ignorance of the true nature of money, or from a desire, on the part of the rulers or other interested persons, to defraud the public.

The principles which govern our monetary system are, at this time, the same precisely as in the Anglo-Saxon period of our history, and such as must, in the nature of things, ever rule wherever a sound commercial polity exists.

In its most extensive signification, money implies a measure of value, and generally it means a piece of one of the precious metals, bearing an impress denoting its weight and fineness.

In the early Saxon times the sceattæ, although very irregular in weight, approached a certain standard of fineness, which, with the weight, became more perfect, and gained a world-wide repute in the penny or sterling which superseded them.

The coined pennies and farthings subserved as tokens to the pound, and the shillings, which were weights of uncoined silver, just as twenty of our shillings serve as legal tokens to the sovereign, though not of the same actual value.

We have seen how the pound, from 7200 grains of uncoined silver, came at the Norman Conquest to be only 5760 grains, or of coined pennies no more than 5400 grains, or 20 Norman shillings of the value of 58s. 1½d. of our present money, comparing weight with weight; but when we take into consideration the diminution in the value of the money since that time, their 20 shillings must have been worth nearly £64 of our present money.

The tax called moneyage, was introduced by the Normans as a consideration that the money should not be altered, so important was it considered at that time that the measure of value should be preserved faithfully. It is supposed to have been introduced by Rufus. The tax was 12 pence to be paid by most persons every three years. It was abolished by Henry I.

Down to the time of Edward I. no alteration seems to have been made ostensibly in the legal weight or fineness of the coins; but there is great reason to believe that there had been frequent frauds upon the people in the deterioration of the money. During the troubles of Stephen, almost every castle had its mint, and base money was struck, against his authority, or at least without any law or ordinance. There was also foreign money of various kinds and different values, professing to be sterling money, introduced, which brought much perplexity, and incalculable mischief upon the people, and especially upon the poor.

In consequence, we find that, in the statute of money made at Carnarvon, in the 12th of Edward I., where payments were to be made to the extent of 5 shillings, it was ordered that they should be made by weight.

The statute goes on to complain of the different kinds of foreign money.

First they make there abroad a money of silver with a mitre, 20 shillings of which weighs only 16 shillings and fourpence of the money of England. They also make two other sorts of money, which are as light as the money with the mitre.

Notwithstanding this complaint, in his 28th year, A.D. 1301, Edward ordained that the pound weight of silver should be shorn into 20s. 3d. By this the pound of 20 shillings was reduced to 57s. 5d. of the present money by weight, and of the value of £24 measured by commodities.

This appears to have been the first legal deterioration of the coinage. Edward the First, however, laboured hard to purify the coinage; and it may be remarked, as a rule in our history, that in proportion to the energy and wisdom of the monarch, the money was improved or deteriorated.

In the weak reign of Edward the Second, the money was much corrupted, and the troubles brought upon the people in consequence find their record in the Act of Parliament of 5th Edwd. II. cap. 29, A.D. 1312 :—

"Forasmuch as at all times when an exchange of money is made in the realm, the people are greatly aggrieved, and in many manners, we do ordain that when

need be, and the king willeth to make an exchange, that he do it by the common council of his baronage, and that in Parliament."

Edward III., A.D. 1326, reduced the penny to 20 troy grains and the pound sterling, or 240 by tale, to 51s. 8d. present money, or in commodities £22.

Henry IV., A.D. 1412. In Act Thirteenth we find hat, by reason of the great scarcity of money at that time in the realm of England, the pound tower might, from the feast of Easter then next following, be coined into 30 shillings by tale. This brought the penny down to 15 grains, and 20 shillings to 38s. 9d. present money, or in commodities to about £13.

Edward IV., A.D. 1460, cut the pound tower into 37 shillings and 6 pennies by tale, by which the pound of 20 shillings was reduced to 31s. of present money, or, in commodities, to about 10*l.* value.

Henry VII., A.D. 1504. Shillings were coined for the first time weighing 144 grains, the weight of the penny being 12 grains, and 20 shillings being equal in weight to present money 31s., or, in commodities, to about 9*l.* 6s. value.

Henry VIII., A.D. 1526. By indenture with the Mint it was ordained that the pound troy should be used, and the pound tower abolished. Ruding says, "that he had recourse to the most disgraceful means to fill his coffers, and stands recorded with infamy as the first of our English sovereigns who debased the fineness of the coins." The pound troy was coined into 45 shillings, and the penny reduced to 10⅔ grains, 20 shillings being equal to 27s. 6d. present money, or nearly 8*l.* in present value in commodities.

The coinage was again, A. D. 1542 debased, 20 shillings being equal to 23s. 3½d. of the present money, and in commodities £6 10s.

It was further debased A. D. 1544; 20 shillings to 13s. 11½d. present money, and to present value in commodities to £3 18s.

It was again debased, A. D. 1545; 20 shillings to 9s. 3½d. present money, and present value 2*l.* 12s.

Edward VI., A.D. 1549. In 1551 another debasement took place, the 20 shillings were reduced to 4s. 7½d. of present money, weight by weight, and to the value in commodities of 1*l.* 6s.

Debasement could go no further. On the 19th October, 1550, a proclamation had been issued, according to which "prices had been set upon all kinds of grain, butter, cheese, and poultry ware," and on the 20th of the following November, "there had been letters sent down to the gentlemen of every shire for the observation of the last proclamation concerning corn, because there came none to the markets, commanding them to punish the offenders;" but that "upon letters written back by the same the second proclamation had been abolished" on the 29th of the same month.

"It was now found by experience that the precious metals, by the common consent of all people throughout the civilised world, had acquired real and proper value; and that it was impossible to set an arbitrary value upon pieces of base metal." Accordingly, the nominal value of the pieces was altered; the shilling to go for 9d.; the groat for 3d., and afterwards for 2d.

A new coinage then took place; the pound sterling to consist of 4 crowns, or 20 new shillings, worth 20s. 6½d. present money, and, in commodities, about 5*l.* 15s. 6d. present value.

Queen Mary, A.D. 1553, coined the pound troy into 60 groats of 11 ounces fine; 20 shillings being equal to 20s. 5½d. present money, or 5*l.* 15s. present value in commodities.

Queen Elizabeth, A.D. 1558, restored the ancient standard, 222 grains fine, and 18 grains alloy; the shillings to weigh 96 grains each. The pound sterling, consisting of 20s. was equal to 20s. 8d. present money, of the value in commodities of 4*l.* 15s., taking the mean of her reign. There was a new coinage (A.D. 1601) of the same standard, the pound troy being coined into 62 shillings, 20 of which shillings were equal to our present pound, and of the value in commodities of 3*l.* 18s. In her reign there was a good deal of silver coined, the produce of the Welch lead mines.

James I., A.D. 1603 to A.D. 1625. But little silver was coined in this reign. 20s. equal to our 20s., weight for weight, and of the value in commodities at the end of his reign of 3*l.* 9s. present money.

Charles I., A.D. 1625 to A.D. 1649. Ruding says of him that it is highly "creditable to the king that in all his difficulties he never debased his coins." 20 shillings equal to our 20 shillings, weight for weight, and of the value in commodities at the end of his reign of 3*l.* present money.

The Protectorate, A.D. 1649 to A.D. 1659. 20 shillings equal to our 20s. weight for weight, and of the value in commodities of about 2*l.* 18s. present money.

Charles II., A.D. 1660 to 1684. 20 shillings equal to our 20 shillings, weight for weight, and of the value in commodities of about 2*l.* 10s.

James II., A.D. 1684 to A.D. 1685. Ruding says, "the short reign of this monarch was, in almost every respect, eminently disgraceful, and in no single instance more so than in the state to which he at length reduced the coinage in his kingdom of Ireland." He, fortunately for the nation, had no time to make any alteration in the English coins. In Ireland, out of 6495*l.* in value, of a mixed metal of old bells, guns, kitchen furniture, pewter, &c., he coined 2,163,237*l.* 9s.!

William and Mary (A.D. 1688 to 1702)—The pound of 20 shillings, equal to our pound, supposing such shillings could have been fonnd (for they were very scarce), was worth 2*l.* 7s. The guinea (so bad were the shillings) was worth 28, and at one time 30 shillings. Though, from the strenuous efforts made by William, the coinage was much improved at the latter part of his reign.

Queen Anne (A.D. 1702-14)—The present pound was worth 2*l.* 4s., or thereabouts. George I. (A.D. 1714-27)—The present pound was worth about 2*l.* George II. (A.D. 1727-60)—The present pound was worth about 1*l.* 12s. 6d. George III. (A.D. 1760 to 1820)—In 1780 the present pound was worth 1*l.* 6s. in commodities. It is hard to say what 20 shillings of the early years of his reign were worth. After the Bank Restriction Act, the pound, as the one-pound note was then called, was worth about 15s. of present money.

Besides the confusion of values arising from the debasement, by fraud, and wear of our own coin, there were circulating here a great variety of foreign coins of various irregular values in relation to our currency. From James II. to George III. these relative values were several times altered arbitrarily.

I have endeavoured to show in a rough way,—for of course, such an estimate could only be an approximation—how the value of the precious metals has gradually diminished, in relation to commodities, since the Conquest; but my principal object in going through these changes was to show what great difficulties have been overcome by the people of this country, and their great power to accommodate themselves to changes; yet with all this power of adaptation, which is the wise characteristic of their race, there can be no doubt that these changes in the money were attended with much perplexity, wrong, and misery to the whole nation.

It is impossible for any one, unacquainted with the history of our currency in former times, to estimate at their full value the advantages we enjoy from the well-regulated currency of the present.

We have the largest gold currency that ever the world saw, kept up, under the present regulations, to its full weight; so that the sovereign—the grand basis of the whole—"a certain weight of gold of specific fineness"—passes from hand to hand without a question.

We have a silver coinage, current for a little more than its value, which keeps it at home, subserving to the sovereign, and in decimal relation to it.

We have a small copper coinage, subserving the silver, deriving, as the silver does, its value from the sovereign; but not in decimal relation to either. And this brings us to the one defect in what, I maintain, is, otherwise, by far the most convenient, the most valuable, and the cheapest currency in the world.

We have shown in the early part of this paper the great advantages which would attend a decimal mode of keeping accounts; but with this small defect in our copper coinage, it would be impossible for us to adopt the decimal mode.

Many wise heads—many among the wisest in this nation—are of opinion that this alteration ought to be made, and have laboured to show how it might be done. They are almost unanimous as to the desirableness of retaining the pound as the integer.

Professor Airy, the Astronomer Royal, says:—"I can scarcely conceive it possible, except by the most violent and offensive measures, to change the principal money of account from its present value of the pound sterling. Every estimation of large and even of very moderate sums, is formed by the pound. I do not attach great importance to such things as the National Debt, or the rental of the country; but the price and rental of private estates, the salaries of officers, the annual wages of servants, down to the lowest female servant—in larger matters, the expense of constructing a railway or sailing a ship—all are estimated by pounds. An alteration of the value of the pound would unhinge every estimate and every contract in England. I say advisedly every contract, for the shilling is inseparably connected with the pound. The things which depend upon the penny are insignificant, even to the lowest classes."

So speaks one of them; and I believe that, in the main, they all very nearly agree, and that the Report of the Committee of the House of Commons upon this subject embodies their opinions.

We have at present the following coins, which stand in one column in their present relation to the pound; and in the other, as they would relate to it were the proposed alteration made:—

		Present Value.			New Value.
Gold	Sovereign	£1,000		=	£1,000
	Half-sovereign	.500		=	.500
Silver	Crown	.250		=	.250
	Half-crown	.125		=	.125
	Florin	.100		=	.100
	Shilling	.050		=	.050
	Half-shilling	.025		=	.025
	Fourpenny	.016.6	— 4 per cent.	=	.016
	Threepenny	.012.5	— "	=	.012
Copper	Rimpenny	.004.16	+ 20 per cent.	=	.005
	Penny	.004.16	— 4 per cent.	=	.004
	Halfpenny	.002.083	— "	=	.002
	Farthing	.001.0416	— "	=	.001

It will be seen that down to the four-penny, there is the most perfect agreement.

The fourpenny and threepenny pieces would require to be diminished in value 4 per cent.; they would then pass under their present names for 16 farthings and 12 farthings respectively.

The large penny with the rim, which weighs nearly an ounce, would require to be raised in value 20 per cent.; it would then pass under the name of rim-penny for five farthings, ten to the shilling.

The remaining copper coins would be reduced in value 4 per cent. and they would pass under their present names.

There would be nothing absurd in this; for there would be still four farthings to the penny, and two farthings to the halfpenny.

In this coinage there would be many ways of paying the odd farthing, without the actual coin. A half-shilling exchanged against two three-penny pieces, would give it; a half-shilling exchanged against a four-penny piece and two pennies, would give it; a rim-penny exchanged against a penny, would give it; a penny and halfpenny exchanged against a rim-penny, would give it; the half-crown would come in, also, as the half-shilling, while it remained in circulation; so that in almost all cases, there would be no necessity for the passing of a farthing. The rimmed pennies, Sir John Herschel states, may be reckoned at about 1-5th of the whole copper circulation.

The poor man would have the penny, about which there has been so much needless talk, near enough for all practical purposes.

A system of currency should stand upon its merits in relation to all classes. If this decimal system be not good for all, it is good for nothing.

The advantages of this plan, which is a slight modification of that recommended by the Committee, are that all the present copper coins would serve. It might be commenced without any new coins, as the value of these could be altered by Royal Proclamation. This would be a great consideration, as there must be, according to Sir John Herschel's evidence, 270,000,000, of copper coins in circulation.

A large amount of the purchases of the poor are never recorded, and so long as they have the coins the same, or very nearly so, they will be very little troubled by the change.

Such persons as cannot depart from pounds, shillings, and pence reckoning and recording, would be able to keep their accounts in their old way. All they would have to do would be, in carrying from the pence column to the shilling, to reckon twelvepence halfpenny for every shilling instead of twelvepence. Thus, suppose their addition of the pence column came to 60 pence; by the present pence-table, that would be five shillings; but they know that for every shilling carried one halfpenny must be deducted; and as four shillings will have to be carried in this instance, two pence must be deducted, which leaves four shillings and tenpence.

A person keeping his accounts in this way would be able to pay any sum whatever by the decimal coinage.

To convert his pounds, shillings, and pence into decimals, nothing more would be required than to multiply his pence by four, adding in the farthings, and his shillings by five, considering the tens of the multiplication by four as the units to be added to the multiplication by five. Thus—

```
£20  4  6¼
     5  4
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£20  225
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In reducing the present denomination of pounds, shillings, and pence to decimals, the best way is, I think, to write the compound sums down in this way:—

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      6
     5
  £20
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Divide the pence by 12, and the shillings by 20, and you have the fraction in the same line with the whole number.

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   12)6
     --
  20)55
     --
 £20.275
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Every person entering upon this enquiry, would naturally give his consideration to each of the three present denominations of money as the basis of a decimal system; at least, this is what most of the enquirers have done who have given the results of their labours to the world.

I have a statement here of the sum of 900*l*. 9*s*. 9¼*d*. expressed in each of the three modes: the pound, the shilling, and the penny.

Present mode	900*l*. 9*s*. 9¼*d*.
Pound mode	900.489*l*.
Shilling mode	18009.78*s*.
Penny mode	216,117.25*d*.

The penny system annihilates everything else but the

penny. The pound, the shilling, and the farthing are nowhere visible, nor any of their combinations as represented in our coins; besides, the number of figures required would render it intolerable.

The shilling system is better; the present coins might be made to serve. It is not uncommon to reckon small amounts by shillings. We frequently hear of thirty shillings, fifty shillings, and so forth; but the pound, the penny, and the farthing would be equally lost.

The pound in every way appears to be the most convenient. Its tenth, or florin, which it is to be hoped will have its name changed into dime, would be the silver unit, and a most convenient one, to which all the lesser coins would refer; and if the half-crowns were withdrawn gradually, and coined into florins or dimes, people would gradually come to reckon, in their small dealings, and small coins, in reference to them, as they do now to the shilling.

In this way we should be able to keep our accounts decimally as far as they relate to weights and money.

The change as a stepping-stone to a complete system would be of very great advantage, and I am sure might be brought about with little inconvenience.

I have thus endeavoured to bring before you, in a practical point of view, the prominent parts of this subject, I am aware how incompletely; but I see with pleasure many gentlemen around me much better qualified for the task, and to them I look to repair my deficiencies in the discussion which I hope will ensue.

DISCUSSION.

The Chairman said it now became his duty to invite observations from the meeting on the very excellent, elaborate, and common-sense paper they had just heard read upon the subject of a decimal system; and in inviting observations on it he trusted he should be pardoned if he asked that those observations should have a practical tendency. The establishment of a system of coins, weights, and measures that would extend not only over Europe but throughout the whole world, was about as possible as the establishment of a universal language; and he thought it would be better to confine themselves to practical questions. With respect to the unit, no person of common sense would hesitate ~~to subscribe~~ to the observations of Professor Airy, that if we abolished the pound sterling as the unit to commence with, we destroyed all our conceptions of value. We must start from that, and then, with the progress we had already made, there remained very little to be done to give us a complete system.

Mr. Wilson observed, that everybody said the silver coinage need not be altered at all. The only difficulty was to make 10d. go to 1s. If they divided the small sum, they would have 50 cents to the 1s. with a like sum to write down, and therefore, instead of making a shilling, it would be desirable to make 10d. go to 1s. and to make an alteration of 1d. 2 farthings equal to 1d. of the present value.

The Chairman.—What is your unit?

Mr. Wilson.—The unit will be 10. By the present system 70d. is 6s. 10d.; by the new system it would be 7s. The great object was to make a simplification of accounts, that was the only thing they required.

Mr. Headlam, M.P., said the paper read by Mr. Miller was full of information upon weights and measures and coinage. With respect to the advantages incident to a system of accounts kept by decimals, the opinion in its favour seemed to be unanimous among practical and scientific men. He did not know that he quite concurred with Mr. Miller in saying that this rested upon any natural system, because the advantages of a decimal system took their origin from the fact of our arithmetical notation. It was not from the fact of a man having 10 fingers, but from the simple fact that, according to our notation, we had separate figures for every number up to 10; and then, when we arrived at that, we placed the figures to the left hand. There was no peculiar virtue originally in the number 10, but, as a matter of fact, our whole system of notation did rest upon that number, and that was the point upon which we commenced placing the figures to the left hand; that method existed in the world from the earliest period; and that there were advantages from the number 10 was clear to any person interested in the mode of keeping accounts. The question seemed to be, in what manner they could bring into operation in this country a different system. Now he (Mr. Headlam) had the misfortune to differ from the scientific gentlemen who gave their opinions before the Select Committee of the House of Commons upon this subject, and also from Mr. Miller, and also from the Chairman, who had expressed a very strong opinion that the pound sterling should be the unit. However necessary it might have been that the pound should be the unit heretofore, it was clear to him that it was impossible they could retain the pound as a unit, and at the same time have the advantages of a decimal system. It seemed very easy, having got so far as the 2s.-piece, to alter the smaller coins; but when they came to alter those smaller coins, the difficulties were inseparable. They knew that the 2s. piece was coined a considerable number of years, yet not the slightest step had since been taken to introduce the decimal system into our coinage. At the present moment the coinage was rather deteriorated by the change than the contrary. There were certain advantages incident both to the decimal system and to the duodecimal system, but perhaps the worst was a combination of both. It was said that the 2s. piece would become the standard, and that they might have decimals below it; but they must remember there were 24 pence in the 2s. piece. But the real objection was with respect to the smaller coins. If they divided the pound into decimal fractions, so as to introduce the one-thousandth part of a pound, then the coins they would have to introduce would not be interchangeable with the existing coins. Supposing that they introduced a new coinage, it was obvious it ought to be a more consistent mode, by which they could pay existing debts and fulfil existing contracts. But the proposal of the House of Commons was that they were to alter their contracts and reduce their taxes and tolls, in order to meet the new coinage. Now he (Mr. Headlam) undertook to say that it was utterly impossible. They would never get Parliament to alter their rates and taxes for any theoretical idea of a new coinage. Let them take the most familiar cases they could conceive. Let them take the tolls upon Waterloo-bridge. A halfpenny was the 480th part of a sovereign. They proposed no coin worth a halfpenny; consequently, they would have no mode of paying a toll of that description. The same thing was true with respect to postage and almost every small payment made in the country. To introduce a system of that kind, they must alter the rates of postage, the rates of railways, and everything else, before a new coinage could be made payable for those things. Now, be a decimal system wise or not, the thing seemed to him as clear as possible that the plan proposed by the Committee of the House of Commons could never be carried out in a country like this. Therefore he thought the best plan would be to give it up, and to consider how they could make themselves satisfied with the existing system. The division of a pound into decimal parts led them into many inconveniences; but if they took a farthing and multiplied it by hundreds and thousands, they arrived at sums which were payable in the existing coinage. There was this difference, that if they began at a farthing and multiplied upwards, they arrived at sums capable of being paid with the existing coins; but if they began at a pound they could not arrive at this result. He regretted the course that had been taken on the subject. Some years ago it

was pressed upon the Government to circulate 2s. pieces. He should have had no objection to that, if the difficulties incident to a copper coinage had at that time been fully considered; but the fact was, those 2s. pieces were circulated, and it was not then considered how they could proceed. The result was that the 2s. pieces were circulated alone, and no progress had been made since, nor did it seem to him that there was any immediate prospect of progress being made.

Mr. J. Ball, M.P., said, no doubt if it were true that scientific men should agree that the decimal system was impracticable, they must submit and remain under the present system, because any one might see that the difficulties suggested by Mr. Headlam were equally great; and if the plan adopted by the Committee of the House of Commons was impracticable, the other plan was equally so, and therefore they had better submit to the existing system. Now with regard to inducing the people of this country to adopt a change of coinage, it should be remembered that the coinage of half Europe had gone through changes far more startling. In Ireland, in the year 1825, a change was effected, by which the Irish shilling, value *thirteen* pence, was altered to the English shilling of *twelve* pence, without any disturbance, or causing much apprehension among even the poorest of the people. Now the question of a decimal coinage resolved itself into this — was the country sufficiently informed on the subject. He thought the Government which should endeavour to force such a system upon the country, before the public were sufficiently informed upon it, would act unwisely, and a notion would get abroad that there was an attempt to defraud the poorer classes. He believed the Government would act wisely if they lagged a little behind, so as to allow the public to be fully informed on this subject; and any discussion such as the present must have a beneficial tendency to produce this effect. But he thought that the difficulties with respect to the payment of taxes, &c., should not be over-rated. Neither the officers of the Customs, nor the public who submitted to the visits of the tax collector, cared much whether they had to pay in mils or in shillings and pence, so long as they had the money in their pockets. He did not desire to deny that the Committee of the House of Commons did not seek to conceal that there were certain positive difficulties; but he believed the real difficulty was, to bring the public mind to familiarize itself with the change; and when the change was effected, he thought those other difficulties would not stand in the way. He believed they were all agreed that whenever the change was effected, the public in all parts of her Majesty's dominions would be large gainers by it.

Mr. W. Brown, M.P., said it was observed by some that the proposed change might lead to frauds upon the poor; but any one who considered how many changes took place in the prices of tea, bread, and other articles, would see that the dealers could as well cheat with a penny as with a farthing. All nations had adopted the largest coin as a starting point—the Americans the dollar, the Romans the crown. He thought the difficulties of making the change were very much over-rated. The poor man, if they went to pay him his wages, would soon find out the difference; there was an aptitude about the people in such matters that led him to believe the difficulties were very much less than was contemplated. He was in the United States when they changed the coinage to dollars from £ s. d., and the people slipped into the change without the least inconvenience. Again, in Ireland, when the poor man got but 12 pence for the 1s. instead of 13 pence, they had the evidence of the Duke of Leinster and other competent witnesses before the Committee, that no confusion arose from the change. At one period, the United States took the sovereign for 4 dollars, but they subsequently depreciated it. At this moment, they found the silver was leaving them, and they were depreciating it 7 per cent. The fact was that a decimal coinage was a labour-saving machine. It might employ less hands at particular work, yet it would enable them to employ more hands at other work, like the labour-saving machines of Lancashire, in order to meet foreign competitors. There were now large numbers of people who used the decimal system in Switzerland, and Portugal was going to adopt the French system of decimal weights and measures. He had asked members of the House of Commons their opinion on this subject, and he had got 200 members to support the views of the Committee. In that 200 he had not asked a member of the Government, yet all the members of the Government had said they were favourable to the measure, and Lord Brougham stated that he would give it every support he could when it came to the House of Lords, and other noble lords had said the same. He (Mr. Brown), believed the battle now lay between the penny and the pound.

Mr. R. R. Moore said that the hon. gentleman (Mr. Headlam) thought there would be very great difficulty in satisfying the people with a decimal system based on the pound as the unit. But if he bore in mind that, whatever new system of coinage they introduced, all the persons with whom the people dealt would become masters to teach them, the difficulty would soon vanish. He never remembered any difficulty in Ireland in changing the value of the shilling: the people very readily understood it; and he believed that two Saturday nights' marketing would not be over before the people of this country would be thoroughly acquainted with the value of the new pieces; they would compare what they received for them with that which they had obtained with the old coins, and they would see at once whether the shopkeeper was giving them their full value, and if any shopkeeper attempted to cheat them they would immediately go to his opposition neighbour. With respect to the tolls on bridges, &c.. alluded to by the hon. gentleman, he (Mr. Moore) thought he could see a way out of that difficulty. The public using the bridge might buy, say a florin's worth of tickets, and so also with postage-stamps. If one only was required, then the additional per centage of value, in the current decimal coin, might be paid. With reference to the issue of a new copper coinage, he might say that he believed if they were to contract to-morrow for the whole number of copper coins they wanted, in six months they would have them at the Bank. Who among them, when they were over-driven in their arithmetic, did not long for some system that would simplify that arithmetic in its application to the million transactions carried on every day. They could not reduce the duty upon tea or sugar, but that the customers found it out directly, even if the reduction did not amount to a farthing. The competition among the shopkeepers compelled them to teach the people; and he believed a decimal system would be one great change in that direction, and that the people would learn it more rapidly than any of themselves.

Mr. Leone Levi stated that, whatever difference of opinion there might exist as to the best system of decimal coinage, the country was greatly indebted to the Committee of the House of Commons, and especially to the honourable member for South Lancashire, Mr. William Brown, for the zeal, judgment, and activity with which they brought the question before the public. Mr. Levi thought the subject was one of the deepest and utmost importance, on account of the saving it would effect in time and trouble in calculation, and of the decided improvement in the mode of valuing things. Indeed, the mere waste of paper caused by the quantity of numbers used in the present confused and perplexing system, was worth consideration. But besides the national advantage [illegible] such a measure, its international bearings were not less important. Foreigners did not understand [illegible] these long multiplications and divisions. [illegible] perplexing to the statistical bureaux of fo[illegible] to reduce our moneys and weights and measures into theirs. At the late Statistical Congress held at Brussels,

the question was discussed, and they passed the following resolution, more especially with reference to weights and measures:—"Que dans les tableaux statistiques dressé dans les pays où le systeme métrique n'existe pas, on ajoute une colonne indiquant la réduction métrique des pois et des mesures."—Mr. Levi thought it all important that the country should be widely informed on the subject, and that one plan only should be discussed, because the consideration of many plans tended to confuse the subject. As the Committee of the House of Commons had had sufficient opportunities to consider carefully all the schemes, and had arrived at a conclusion in harmony with the views of the highest authorities in the country, it would be very desirable to afford them an unanimous support. Mr. Levi hoped that the Committee of the House of Commons would prosecute their inquiries with a view to the introduction of decimalization in weights and measures, and they would confer an immense benefit to the people of this country—to every boy at school—to every clerk in the counting-house—to every merchant—and to every statist.

Mr. W. Brown, M.P., said that at this very moment the French Consul at Liverpool had been requested by his government to go to Manchester, to endeavour to get the merchants there to decimalize their measures in order to facilitate the passing of their goods through the French Custom House during the Paris exhibition of 1855.

Mr. Laurie entered into an exposition of his plan of decimalizing the currency, which he stated would shortly be published. He tendered his best thanks to Mr. Miller for his excellent paper; and as one of the witnesses examined before the Committee of the House of Commons, he begged to state that both witnesses and members were so impressed with the necessity of retaining the pound as an integer, that he never once thought of anything else; though he agreed with Mr. Headlam, that the pound could not be the standard, if a decimal system was to be adopted.

Mr. Franklin said he also had been a witness before the Committee, and he had come to the conclusion that the pound was the proper unit, and he was convinced they could not accept any other. He did not think there was much difference of opinion as to whether we should have a decimal system; that appeared to be agreed upon all hands. They were reduced to the simple consideration of what was the best unit, and he believed there was very little difficulty in perceiving that a gold standard was the best to be subdivided. If this plan was carried out they would have no violent change to make, the halfpenny and the farthing would be the only coins they would have any difficulty with. He heartily supported the views of the writer of the valuable paper read that evening.

Mr. Miller, in reply to the objections that had been taken to his paper, said Mr. Headlam doubted whether the decimal system rested upon a natural basis; he (Mr. Miller) had his doubts also, but he merely threw that out as a suggestion, and he did not mean to contend for it. Mr. Headlam also said we could not retain the pound and have a decimal system; he also urged that though the 2s. pieces were introduced some years ago no further step had been taken. But he (Mr. Miller) would remark that the 2s. piece was introduced at first in such small numbers that the people kept them in their pockets as curiosities. And the 2s. 6d. pieces were not withdrawn; if the latter were withdrawn gradually, the 2s. pieces would be soon circulated, but the two coins could not work together. The very great evils which those gentlemen who opposed the plan described in the paper attributed to the penny and tenpence, were almost enough to frighten anybody, and they put him in mind of the terrible onslaught made by Dean Swift on Wood's copper coinage. With respect to the alleged difficulty of reconciling the people to any change in the coinage, it should be borne in mind that a vast amount of foreign coins were circulated in this country, especially from the time of Charles the First to the beginning of the reign of George I., and more particularly in Ireland the value of the various coins was altered, yet the people accepted them. But the difficulties were not with the people but with those who had crotchets, or those who could not accommodate themselves to new changes. There were only two coins,—the 6d. and the 5s. piece,—that would come in with tenpence. The pound would not, and the shilling would not, and he could see no other coin that would. Mr. Ball objected to the plan proposed on account of its requiring the introduction of a new coin, but to introduce new coins was not a matter of half such difficulty as to abstract the old ones. Mr. Miller, after briefly noticing some of the remarks which had been made by Mr. Moore, Mr. Laurie, and Mr. Franklin, concluded by thanking the meeting for the attention with which they had heard the details into which he had found it necessary to enter.

A vote of thanks having been passed to Mr. Miller for the paper he had read,

The Secretary announced that on Wednesday next, the 12th instant, Dr. Neil Arnott would read a paper "On the Construction of Domestic Fire-places, with a description of a new Fire-place combining the advantages of an Open Fire with Economy of Fuel and Consumption of Smoke."

Home Correspondence.

CONTINENTAL SCHOOL-BOOKS.

Letter III.

Sir,—In my first communication on this subject I said that I hoped to write three letters in three successive weeks. They have really been written in three successive months. I shall be glad if this third letter is in time to be of any use in reference to the Exhibition of Educational Apparatus.

4. Wall-Maps and Diagrams.—Two names which I mentioned in connection with school atlases, Kiepert and Sydow, are the first that occur to me when I come to speak of German wall-maps. Kiepert's excellent "Wandkarten" of Ancient Italy, Ancient Greece, the Roman Empire, and Ancient Rome, are well known in classical schools throughout Europe; but those constructed by Sydow, with special reference to physical geography, are more to our present purpose. Their excellence consists in the admirable skill with which the geognostic character and picturesque physiognomy of countries is represented to the eye. At first sight they are rather confusing, in consequence of their minute detail. This at least is true of the map of Germany, with which I am best acquainted. But, after a little experience, it becomes even eloquently clear; and it should be used with the "Regleitworte" which are published to accompany it. The rest of the series consists of Europe, Asia, Africa, America, and the World. There are other wall-maps, well worthy of attention, published by Hollé, at Wolfenbüttel; by Roost, at Munich; by Winkelmann, at Esslingen; and by Stülpnagel and Bretschneider, at Gotha. I imagine that Germany is at the head of all continental countries in what relates to school-apparatus of this kind. German maps are seen, as a matter of course, on the walls of Dutch and Swiss schools. I am not able to say much concerning France; but as excellent specimens of the Blank Map (*carte muette*), I may mention those of Europe and France, published by Andriveau-Goujon, 21, Rue du Bac, Paris. I have seen few superior, as regards clearness of colouring and distinct delineation of physical features.

In the preparation of Diagrams for scientific instruction, as distinguished from Wall-maps for the purpose of geographical teaching, it is probable that France is superior to Germany. The illustrations of steam-engines, &c., published by Matthias (Librairie Scientifique Industrielle,

15, Quai Malaqais, Paris), are well known to many persons in this country. I think it was in Belgium that I saw some plans, elevations, and sections of a locomotive, in the form of useful wall-diagrams, published by Logerot, Quai des Augustins, Paris. If I am not mistaken, I noticed the following in Holland:—"Tableau de Mécanique théorique et pratique. Langlois et Leclerq, 81, Rue de la Harpe, Paris," and "Tableau de l'Ingénieur Mécanicien des Chemins de Fer—Tableau Elémentaire de Mécanique Industrielle—Tableaux Synoptiques des Principaux Instruments de Chimie," (Maison Bonet, 33, Rue de Seine, and 64, Rue St. Jacques, Paris). And I may conclude what I have to say on this head by mentioning what perhaps belongs more properly to the former, a diagram which caught my eye in a school at Leipzig, and which represents the geographical distribution of the sugar-cane, published at Berlin (Herbig, 1853), by Stolle, who has written a book on the subject.

5. Drawing.—The memoranda which I find relating to this subject may be arranged under the heads of French and German, without any attempt at further classification.

I observed in Belgium or elsewhere the following elementary works, all published in Paris:—"L'Ecole de Dessin, 3, Rue Suger." Tripon, "Etudes Elémentaires de Lavis. Bulla Frères et Jouy" (in three parts, ornament, architecture, and mechanics). "Cours de Dessin Linéaire. Langlumé" (containing machines, with introductory explanation).

Among German publications I may first notice those of Haindl, "Die Linear-Zeichnung. 1843," and the "Maschinenkunde und Maschinenzeichnen. Cotta, Munich, 1839" (a very cheap work in four *Lieferungen*, with text to correspond, but perhaps not so applicable to England as to Germany, where wood is used more and iron less for purposes of construction). The three important works of Mauch (containing examples of Greek art, especially from Vases, and published at Berlin); of Eisenlohr (comprising Greek, Byzantine, and Early German ornament, Veith. Carlsruhe); and of Heideloff ("Ornamentik des Mittelalters. Riegel u. Wiessner. Nürnberg"), seem to be much used in the best Drawing Schools of Germany, such as those of Carlsruhe and Munich. At the last mentioned city my attention was attracted to the following books and apparatus, with which I conclude:—"Metzger's Baukunde. Cotta, 1847." Schneitler, "Die Instrumente u. Werkzeuge der Höheren u. Niederen Messkunst. Leipzig, 1852." Stolz, "Modelle u. Gebirgsreliefe. Mey u. Widmayer. Munich, 1852;" and "Vorschriften für Topographische Zeichnungen, 1845."

6. Miscellaneous.—This paragraph might be extended to a considerable length, if I could examine all the materials collected during my desultory journey last summer, and on other occasions; but this I am unable to do. It may be worth while to give the titles of the following books connected with mercantile education:—"Schiebe's Contorwissenschaft" (3rd Ed. Leipzig, 1852); and by the same author, "Die Lehre von der Buchhaltung" (4th Ed. Leipzig, 1852); "Meeden's Handelscorrespondenz" (Bremen); "Der Kauffman als Lehrling Commis u. Principal" (by Noback. Pub. by Wigand, Leipzig, 1850); and "Krüger's Kauffmaun" (edited by Langhenne, Hamburgh.)

It is said in a leading article in the *Times* of this day, that "the Germans write books, and we turn them to account." This is as likely to be true in reference to industrial instruction as any other subject; and it is to be hoped that the Exhibition with which the centenary year of the Society of Arts is to be distinguished, will contain, among other apparatus, a goodly collection of German school books, and that we English schoolmasters shall be able to "turn them to account."

Faithfully yours,

J. S. HOWSON.

Collegiate Schools, Liverpool,
April 29, 1854.

MEETINGS FOR THE ENSUING WEEK.

Mon. Royal Inst., 2.—General Monthly Meeting.
Geographical, 8½.—1. Mr. J. H. Smith, "Observations on the Territory of Burica, in the Province of Chiriqui." 2. Mr. J. Smyth O'Connor, "Tour up the River Gambia, beyond the Falls of Barracouda."

Tues. Royal Inst., 3.—Professor Tyndall, "On Combustion."
Syro-Egyptian, 7½.
Civil Engineers, 8.—Mr. W. Fairbairn, "Description of the New Building Slip at Keyham Dockyard."
Medico-Chirurgical, 8½.
Zoological, 9.

Wed. Royal Botanic, 3¾.
Royal Soc. Literature, 4½.
Society of Arts, 8.—Dr. Arnott, "On the Construction of Domestic Fire-places, with a Description of a new Fire-place, combining the advantages of an Open Fire with Economy of Fuel and Consumption of Smoke."
Graphic, 8.
Geological, 8.—1. Sir P. Egerton, "On a Fossil Homocercal Fish from the upper Beds of the New Red Sandstone." 2. Sir P. Egerton, "Note on some of the Pycnodont Fishes, hitherto ascribed to Tetragourlepis." 3. Mr. M. A. Delesse, "On Pegucalite in Ireland." 4. Mr. J. O. Westwood, "On some Fossil Insects."
Archæological, 8½.

Thurs. Royal Inst., 3.—Mr. M. T. Masters, "On Botany."
Antiquaries, 8.
Royal, 8½.

Fri. Astronomical, 8.
Philological, 8.
Architectural Assoc. 8.—Class of Design.
Royal Inst., 8½.—Mr. T. H. Huxley, "On the Common Plan of all Animal Form."

Sat. Horticultural, 2.—Exhibition.
Royal Inst., 3.—Dr. R. G. Latham, "On the Importance of the Study of Language as a Branch of Education for all Classes."
Royal Botanic, 3¾.
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, April 28th*, 1854.]

Dated 25th January, 1854.
187. J. Petrie, jun., Rochdale—Drying wool.

Dated 10th February, 1854.
322. W. Dray, Swan lane—Portable farm buildings.

Dated 1st March, 1854.
499. J. B. Gottung, 7, Hawley place, Kentish town—Embroidering on leather. (A communication.)

Dated 15th March, 1854.
616. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Heating apparatus. (A communication.)

Dated 20th March, 1854.
655. E. Esnouf and C. Mauger, jun., and G. W. Lewis, Jersey—Portable dwellings.

Dated 6th April, 1854.
789. J. Smith, St. Leonard's on Sea—Railways.
791. C. de Bergue, 9, Dowgate hill—Apparatus for acting on water.
793. S. O'Regan, Liverpool—Furnaces.
797. J. Yule, Glasgow—Raising minerals from mines.
799. A. V. Newton, 66, Chancery lane—Hot air engines. (A communication.)
801. J. Worrall, jun., Salford—Bleaching fustians, &c.

Dated 8th April, 1854.
826. T. Bromley, Liverpool—Soap.
830. W. Williams, Ebbw vale, and T. E. Williams, Pontypool—Reverberatory furnaces.
832. W. C. Moat, Strand—Crushing, &c., machine.
834. H. Gilbee, 4, South street, Finsbury—Axle boxes and bearings. (A communication.)

Dated 10th April, 1854.
836. W. Wood, Pontefract—Treating animal matters.
837. W. Wood, Pontefract—Cut pile fabrics.
838. A. S. and F. S. Bolton, Birmingham—Steam boilers.
839. A. S. and F. S. Bolton, Birmingham—Metallic tubes.
840. F. L. Bauwens, Pimlico—Distilling fatty bodies.
841. W. L. Baker, Hargreave—Clock, &c., bells.

Dated 11th April, 1854.
842. R. A. Brooman, 166, Fleet street—Hats. (A communication.)
843. Z. Round, Dudley—Bricks.
844. W. E. Brooks, Queen street—Valves for atmospheric railway tubes.
845. E. Lavender, 87, Princes road, Bermondsey—Stirring matters subjected to heat in retorts.
847. C. A. Noedl, Upper St. Martin's lane—Vapour bath.
848. J. Mitchell, Dunning's alley—Pulverising, &c., ores.
849. J. J. Pelle, Whitehaven—Lifting jack.
851. U. Scott, Camden town—Boots and shoes.
852. J. Miller, jun., and M. Burke, Liverpool—Transmitting motive power.
853.—T. Carr, Liverpool—Steering apparatus.
854. B. Fothergill and W. Weild, Manchester—Combing fibrous materials.
855. W. H. James, Camberwell—Marine structures.

Dated 12th April, 1854.

856. L. Cruger, Washington—Attaching propellers to ships. (A communication.)
857. E. Briggs, Rochdale—Finishing yarn and thread.
858. R. Whiteside, Birkenhead—Purifying grain.
859. W. Coltman, Leicester—Knitting frames.
860. J. Piper, Shoreditch—Affixing adhesive stamps.
861. S. Colt, Spring gardens—Cutting or shaping metals. (Partly a communication.)
862. G. Letts, Northampton—Mole trap.

Dated 13th April, 1854.

863. S. B. Parker, Deptford—Consuming smoke.
864. E. W. Hansen, Saxe gotha—Electro-magnetic engraving machine.
865. G. Elliot, St. Helen's—Carbonate of soda.
866. A. H. Cox, Brighton—Coating pills.
867. J. Greenwood and R. Smith, Bacup—Finishing textile fabrics.
868. G. Devincenzi, Grosvenor street—Ornamented surfaces for printing.

Dated 15th April, 1854.

869. J. Griffiths, Moorgate street—Measuring instrument.
871. H. Meyer, Manchester—Looms.
872. J. Croisy, Paris—Manufacturing bolts, rivets, &c.
873. T. Lawes, 32, City road—Protectors for the head. (A communication.)
875. A. Chaplin, Glasgow—Cast iron to building purposes.
876. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Priming fire-arms. (A communication.)
877. F. Barnett, 6, Caroline street, Bedford square—Illuminated furniture.
878. A. E. L. Bellford, 16, Castle street, Holborn—Manufacture of sheet and wrought iron. (A communication.)
879. G. L. F. Tiret, Paris—Canvas for embroidering.

Dated 17th April, 1854.

880. G. Heyes, Aspull, near Wigan—Driving apparatus of machinery.
881. Dr. T. Hawkins, Northfleet—Upward draught in chimneys.
882. W. Wilkinson, Nottingham—Ropes and cords.
883. W. H. Bentley, Bedford—Cannons, &c.
884. B. Fullwood, Bermondsey—Cement.
885. J. A. Smith, Edinburgh—Explosive projectiles.
886. D. Tannahill, Glasgow—Lithographic and zincographic printing.

Dated 18th April, 1854.

887. C. C. Davis, Bath—Blow-pipe apparatus.
889. C. Meason, Warrington—Supplying fuel and water to locomotive engines.
893. C. Watt, 17, Gloucester gardens—Bleaching fibrous substances.
895. J. Frearson, Smethwick—Steam engines.
897. J. F. F. Challeton, Brughat—Peat.

WEEKLY LIST OF PATENTS SEALED.

Sealed April 28th, 1854.

2495. Malcolm Maclaren, of Johnstone, N.B.—Improvements in fire-places, grates, or furnaces.
2503. Richard Archibald Brooman, of 166, Fleet street—Improvements in machinery for dressing flax, hemp, and other like fibrous substances.
2507. John Turner Wright, Edwin Payton Wright, and William Asbury, all of Birmingham—Improvement or improvements in mill banding.
2509. Edward Gregson Banner, of Cranham hall, Essex—Improvements in obtaining and applying motive power.
2511. Felix Paulin Rovère, of 4, Wellington street, Strand—Improvements in joints for tubular drains.
2516. John Brown, of Darlington—Improvements in the construction of wagons.
2517. Damiano Assanti, of Upper Berkeley street—Improved cooling and freezing mixture.
2522. Samuel Lomas, of Manchester—Improvements in machinery for spinning and doubling silk.
2536. Edwin Dalton Smith, of No. 7, Hertford street, May fair—Buffer break for railway carriages.
2543. Henry Brierley, of Chorley—Improvements in machinery or apparatus for spinning and doubling cotton and other fibrous substances.
2571. Samuel Harrison, of Crewe—Improvements in and applicable to steam engines.
2573. Charles Carr and William Kyle Horsley, both of Seghill—Improvements in steam machinery and pumps for lifting water from mines and other places.
2576. James Barlow and Thomas Settle, both of Bolton-le-Moors—Improvements in power looms for weaving.
2581. Marino Louis Joseph Christophe Vincent Falconi, of Paris—Composition for the preservation of the dead.
2595. George Shepherd, of 39, King William street—Improvements in the construction of railways.
2641. Charles De Bergue, of Dowgate hill—Improvement or improvements in machinery or apparatus for removing patterns from moulds for castings.
2664. Solomon Abraham and Samuel Victor Abraham, of Lisle street—Communicating information or directions to persons in charge of railway trains.
2835. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in printing oil cloths and other fabrics. (A communication.)
2901. William Frederick Plummer, of St. Mary's Overy wharf—Improved machinery for grinding or crushing animal, vegetable, and mineral substances.
2980. James Gibbons the younger, of Wolverhampton—Improvements in locks and latches.
2992. Gustav Adolph Buchholz, of Gould square, Crutched friars—Improved machinery for the cleaning and hulling or dressing of rice, wheat, and other grain.
281. Robert Stirling Newall, of Gateshead—Improvements in setting up ships' rigging.
312. Peter Armand Le Comte de Fontaine Moreau, of 4, South street, Finsbury—Improvements in fire-arms.
328. Henry Warner, and Joseph Haywood and William Cross, all of Loughborough—Improvements in knitting machinery.
353. Thomas Bury, Walter Glover, James William Speed, and John Hardman, all of Salford—Improvements in machinery or apparatus for stretching, drying, and finishing yarn and woven fabrics composed of cotton, wool, silk, or other fibrous materials.
356. Charles Augustus Holm, of 21, Cecil street, Strand—Improvements in propelling.
365. Benjamin Hornbuckle Hine, and Anthony John Mundella, and William Onion, all of Nottingham—Improvements in machinery for the manufacture of textile and looped fabrics.
414. Robert Walker, of Glasgow—Improvements in signalling by voltaic electricity for the purpose of increasing the safety of railways.
415. James Boydell, of 65, Gloucester crescent, Regent's park—Improvement in the manufacture of hurdles and gates.
429. Samuel Colt, of Spring gardens—Improved machinery for rifling fire-arms. (Partly a communication.)
444. Samuel Little Hardy, M.D., of Dublin—Improved apparatus for applying chloroform vapour or other similar vapour in certain cases.
464. Charles Lamport, of Workington—Improvements in machinery used in ship building.
465. James Boydell, of 65, Gloucester crescent, Regent's park—Improvements in the manufacture of hurdles and fences.
473. Charles de Bussy, of 45, Mornington road, Regent's park—Improvements in machinery or apparatus for the amalgamation of gold ores.
485. André Louis Mallet, of Paris—Improvements in apparatus to destroy the effects of shocks.
496. Charles Hargrove, of Birmingham—Improvement or improvements in steam boiler and other furnaces.
534. John Warhurst, of Hollingworth—Improvements in steam boilers.

Sealed April 29th, 1854.

2464. David Bogue, of Fleet street—Improved mode of producing printing surfaces.

Sealed May 1st, 1854.

2524. Mark Newton, of Tottenham—Improvements in the construction of carriages, and in the means of preventing the overturning of the same when horses take fright. (A communication.)
2525. Arthur Elliott, of West Houghton—Improvements in looms for weaving.

Sealed May 2nd, 1854.

2556. George Duncan and John Boyd, both of Liverpool, and John Barker, M.D., of Knotty Ash, near Liverpool—Improvements in casks, and in machinery or apparatus for the manufacture of casks.
2559. George Nasmyth, of 3, Brabant court, Philpot lane—Improvements in the construction of steam boiler and other furnaces.
2562. William Crosland, of Hulme—Improvements in apparatus for governing the speed of steam and other motive power engines.
2686. James Harris, of Hanwell—Improvements in apparatus for heating water and other fluids.
2707. Edward Briggs, of the Castleton mills, near Rochdale—Improvements in weaving and manufacturing raised piled fabrics, and in machinery employed therein.
2899. John Zuill Gay, of Dundee—Improvements in gas meters.
2909. Jacques Pierre Henri Vivien, of Paris—Improvements in the manufacture of paper and pasteboard.
2951. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in presses for expressing oil or other fluids from fruits, grains, or other substances.
41. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in machinery or apparatus for effecting agricultural operations, and in communicating power thereto, parts of the said improvements being applicable to the obtainment of motive power for general purposes.
78. John Fuller Boake, of Dublin—Improvements in and applicable to certain lamps or lanterns, so that either candles or oil may be used therein with facility.
196. Charles Reeves, junior, of Birmingham, and William Wells, of Sutton Coldfield, near Birmingham—Improvement or improvements in casting metals.
502. William and Joseph Clibran, of Manchester—Improvements in apparatus for regulating or governing the supply or pressure of gas as it is conducted from the main to the burners.

Sealed May 3rd, 1854.

2554. Peter Hindle, of Ramsbottom—Improvements in power looms for weaving.
2556. Ebenezer Goddard, of Ipswich—Improvements in gas burners.
2566. Henry Pratt, of Worcester—Improvements in kneading dough, and which said improvements are also applicable to the kneading or beating of clay, loam, or other plastic materials.

Journal of the Society of Arts.

FRIDAY, MAY 12, 1854.

EXPOSITION UNIVERSELLE, 1855, PARIS.

The Council desire to announce that they are willing to afford all the assistance in their power to the Colonies in enabling them to be advantageously represented at the Paris Exhibition of 1855.

Communications from the Colonies on this subject should be addressed to the Secretary of the Society of Arts, Adelphi, London.

EDUCATIONAL EXHIBITION.

The Council of the Society of Arts solicits attention to the intended Educational Exhibition at St. Martin's Hall, in June next.

To give full development to this undertaking, to procure the co-operation, not only of the great Educational Societies and Institutions at home, but also in the Colonies and the Continental States, and to illustrate it by Lectures, with practical discussions, a considerable outlay must be incurred.

The Council deems it a duty to secure the funds of the Society from an expenditure which would interfere with its ordinary proceedings, and therefore invites the cooperation of the Members of the Society, and of other friends of Education.

The following subscriptions have been already received:

FIRST LIST.

	£	s.	d.
H.R.H. PRINCE ALBERT, President,	100	0	0
W. Atkinson	1	1	0
Miss M. G. Barnett	5	0	0
Hon. and Rev. S. Best	2	2	0
William Bird	5	5	0
Robert E. Branston	2	2	0
Major-General Buckley, M.P.	5	0	0
John Cattley	5	5	0
Harry Chester	20	0	0
G. Child	1	1	0
Rev. Samuel Clark	2	2	0
George Clowes	10	0	0
Henry Cole, C.B.	1	0	0
E. Collins	1	1	0
Elias Davis	2	2	0
Joseph Dickinson, M.D.	1	1	0
Warren De la Rue, F.R.S.	5	5	0
C. Wentworth Dilke	10	0	0
J. M. Dodd	2	2	0
Captain F. Eardley Wilmot, R. A.	3	3	0
William Ellis	5	0	0
William Ewart, M.P.	5	0	0
Archdeacon Lane Freer	3	3	0
J. W. Gilbart, F.R.S.	5	5	0
Peter Graham	2	2	0
M. H. Gregory	1	1	0
The Earl Granville	25	0	0
F. Seymour Haden	1	1	0
W. Parker Hammond	5	5	0
The Dean of Hereford	3	3	0
Henry Thomas Hope	20	0	0
J. Holmes	1	1	0
Joseph Hume, M.P.	5	0	0
L. L. Boscawen Ibbetson, F.R.S.	3	3	0
Henry Johnson	10	10	0
T. Lambert	2	2	0
The Marquis of Lansdowne	20	0	0
Sir C. Lemon, Bart., M.P.	5	0	0
J. C. MacDonald	2	2	0
Thomas Martin	2	2	0
Lord Overstone	10	0	0
Captain H. C. Owen, R.E.	3	3	0
Lieut.-Gen. Sir. C. Pasley, K.C.B.	5	5	0
Sir Joseph Paxton	5	0	0
Samuel M. Peto, M.P.	25	0	0
Samuel Redgrave	3	3	0
James Meadows Rendel, F.R.S.	10	0	0
W. Pierce	2	2	0
John Scott Russell, F.R.S.	10	0	0
A. Salomons	2	2	0
W. Wilson Saunders	10	10	0
Robert Stephenson, M.P.	20	0	0
Duke of Sutherland, K.G.	10	0	0
William Tooke, F.R.S.	5	0	0
W. C. Trevelyan	4	0	0
The Rt. Hon. H. Tufnell, M.P.	10	0	0
Thomas Twining, jun.	10	0	0
Thomas Winkworth	2	2	0

TRADE MUSEUM.

Communications have been received from the Secretaries of many Institutions promising aid and co-operation, and sending lists of local manufacturers and others likely to contribute specimens. In Macclesfield a committee has been formed, of which the mayor, John Smith, Esq., is chairman. In some cases fears are expressed that "it will not be in their power to be of much assistance." It is certain, however, that the members of every Institution in the country have it in their power to contribute specimens, and to aid the Museum in various other ways. Information of all kinds respecting animal manufactures and products will be valued, and, as regards specimens, it must be remembered that it is not only sought to obtain those which are peculiarly fine or large, but all those which are in any way instructive. In illustration, ten classes of animal products may be mentioned, namely, refuse matters of all kinds, such as clippings of skins, hoofs, horn, shell, ivory, parchment, etc., feather refuse, shoddy, and dressings of woollen fabrics, only useful in chemical manufactures and as manure. Again, old specimens of animal manufactures, showing the production of past years, and illustrating the dyeing and manufacture of those times, will be of great interest, to compare with those of the present year and the products of future years. The following are the Institutions from which letters have been received:—

Ashton and Dukenfield, Mechanics' Institution.
Bramley, Mechanics' Institute.
Buckingham, Literary and Scientific Institution.
Clapham, Literary and Scientific Institution.
Coggeshall, Literary and Mechanics' Institute.
Croydon, Literary and Scientific Institution.
Creiff, Mechanics' Institution.
Derby, Mechanics' Institution.
Lancaster, Athenæum.
Leeds, Mechanics' Institution and Literary Society.
Macclesfield, Society for the Acquirement of Useful Knowledge.
Maidenhead, Mechanics', Literary and Scientific Institution.
Northampton and Northamptonshire, Mechanics' Institute.
Portsmouth and Portsea, Literary and Philosophical Society.
Shelton (near Newcastle-under-Lyne), Potteries Mechanics' Institution.
Slough, Mechanics' Institution.
Stourbridge, Mechanics' Institution.
Wenlock, Agricultural Reading Society.

Windsor and Eton, Literary, Scientific and Mechanics' Institution.
Wiveliscombe, Mutual Improvement Society.

The Lords Commissioners of Her Majesty's Treasury have given directions to the Commisioners of Customs, on the arrival of any packages containing objects for this Museum, addressed to Professor Solly, to send them in charge of an officer to the House of the Society, to be there examined and delivered free of duty.

TWENTY-FIRST ORDINARY MEETING.

WEDNESDAY, MAY 10, 1854.

The Twenty-first Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 10th instant, Dr. LYON PLAYFAIR, C.B., in the chair.

The following candidates were balloted for and duly elected Ordinary Members:—

Sorrell, William | Williams, Charles Wye

The following Institutions have been taken into Union since the last announcement:—

356. Huddersfield, Mechanics' Institution.
357. Spilsby, Literary and Scientific Institution.

Previous to the reading of the Paper, the Secretary called attention to several cases of Mathematical Instruments, submitted by Messrs. Parkes and Sons, of Birmingham. The inventors claim that, the joints being made of hard rolled metal, cut out by machinery, they are stronger than those in ordinary use; that the compass-legs being formed of tubes, are lighter; that the dividers have hard steel needle points; and that the drawing-pens, being hollow on the inner side, retain a larger quantity of ink. The prices of these cases of instruments are 2s., 2s. 9d., 3s. 3d., 7s., 10s., 13s., and 13s. 6d. respectively. The Council would feel obliged by those Members of the Society who have a practical knowledge of the subject, examining the instruments and communicating the result of their observations to the Secretary. The great importance of securing a cheap and useful case of instruments for artizans and schools, has long been acknowledged by the Society, and the Council cannot but regret that hitherto their efforts have not been so successful as they could wish.

The paper read was

ON A NEW SMOKE-CONSUMING AND FUEL-SAVING FIRE-PLACE,

WITH ACCESSARIES ENSURING THE HEALTHFUL WARMING AND VENTILATION OF HOUSES.

By NEIL ARNOTT, M.D., F.R.S.

The great evils connected with the common coal fires are:—

1. Production of Smoke.
2. Waste of Fuel.
3. Defective Warming and Ventilation of Rooms.

We shall consider these in order:—

1. OF SMOKE IN THE INTERIOR OF HOUSES AND IN THE EXTERNAL ATMOSPHERE.

The proverb which declares a smoky chimney to be one of the greatest troubles of life, may suffice in relation to the interiors; in regard to the exterior, many particulars have to be noted. Examination of the question has ascertained that in London alone, on account of its smoke-loaded atmosphere, the cost of washing the clothes of the inhabitants is greater by two millions and a half sterling a year (that is, twenty-five times one hundred thousand pounds), than for the same number of families residing in the country; and this is seen to be but a small part of the expense when we consider the rapid destruction of all furniture in houses, as of carpets and curtains, of articles of female apparel, of books and paintings, of the internal decorations, and even of the external surface of the stones of which edifices are built. For personal cleanliness it is necessary to be almost constantly washing the hands and face. Flowering shrubs and many trees cannot live in the London atmosphere, so that the charm of a garden, even at considerable distances from town, has almost ceased with the extension of the buildings and increase of smoke. A growing flower, if exposed to the atmosphere, is always covered with blacks or sooty dust, and defiles the hand which plucks or touches it. Sheep from the country, placed for a few days to graze in any of the parks, have soon a dingy fleece, strikingly apparent when others newly arrived are mixed with them. And this atmosphere, so damaging to inanimate things and to vegetable life, is inimical also to the health of man, as proved by numerous facts recorded in the bills of mortality. Many persons, with certain kinds of chest weakness, cannot live here. Many children brought from the country are seen soon not to be thriving. The coal-smoke, then, may be called the great nuisance and opprobrium of the English capital.

2. OF WASTE OF FUEL.

Count Rumford, a writer of great authority in such matters, after making many elaborate experiments, declared that five-sixths of the whole heat produced in an ordinary English fire goes up the chimney with the smoke, to waste. This estimate is borne out by the facts observed in countries where fuel is scarce and dear, as in parts of Continental Europe, where it is burned in close stoves, that prevents the waste. With these a fourth part of what would be consumed in an open fire, suffices to maintain the desired temperature. I have myself made experiments here in London with like results. To save a third part of the coal burned in London alone, would save more than a million sterling a year; and when coal is very dear, as during last winter, the saving would be much greater.

Then it is to be considered that coal is a part of our national wealth, of which, whatever is once used can never, like corn or any produce of industry, be renewed or replaced. The coal mines of Britain may truly be regarded as among the most precious possessions of the inhabitants, and without which they could never have attained to the importance in the world which the extraordinary development of their mental and bodily faculties has now given them. It is enough to say that without coal they would not have had or used the steam-engine. To consume coal wastefully or unnecessarily, then, is not merely improvidence, but is a serious crime committed against future generations.

3. OF DEFECTIVE HEATING AND VENTILATING IN DWELLINGS.

Calling a thousand a week the average rate of mortality in London alone, it was found in the middle of last winter, that nearly 700 additional deaths occurred owing to the intense cold which then prevailed, and against which, evidently, the existing arrangements for warming and ventilating were insufficient. Not a little of the premature mortality at all times, and of the spread of epidemics, and of the low condition of health among the people, is doubtless owing to the same cause.

We shall now inquire whether it be or be not possible

in a great measure to avoid the three great evils above described, and at the same time to secure other advantages.

1. Smoke.

Is it possible to avoid or to consume smoke—in other words, to produce a smokeless coal fire?

Common coal is known to consist of carbon and bitumen or pitch, of which pitch again the elements are still chiefly carbon and hydrogen, a substance which, when separate, exists as an air or gas.

When the coal is heated to about 600° Fahrenheit, the bitumen or pitch evaporates as a thick, visible smoke, which, when it afterwards cools, assumes the form of a black dust or flakes, called blacks, or smut, or soot. If that pitch, however, or pitchy vapour, be heated still more, as it is in the red hot iron retorts of a gas work, or in rising through a certain thickness of ignited coal in an ordinary fire, it is in great part resolved into invisible carburetted hydrogen gas, such as we burn in street lamps.

Now when fresh coal is thrown upon the top of a common fire, part of it is soon heated to 600°, and the bitumen of it evaporates as the visible smoke, which immediately rises. Of such matter the great cloud over London consists. If the pitchy vapour, however, be heated to ignition by the contact of a flame or of ignited coal near the surface, it suddenly becomes in great part gas, and itself burns as flame. This is the phenomenon seen in the flickering and burning which takes place on the top of a common fire.

But if fresh coal, instead of being placed on the top of a fire, where it unavoidably must emit visible pitchy vapour or smoke, be introduced beneath the burning, red-hot coal, so that its pitch, in rising as vapour, must pass among the parts of the burning mass, it will be partly resolved into the inflammable coal gas, and will itself burn and inflame whatever else it touches. Persons often amuse themselves by pushing a piece of fresh coal into the centre of the fire in this way, and then observing the blaze of the newly-formed gas.

Various attempts, beginning perhaps with Dr. Franklin's, have been made to feed fires always from below, and so to get rid altogether of smoke. Another more recent one was made about thirty years ago, by an ingenious manufacturer in London, Mr. Cutler. He placed a box filled with coal under the fire, with its open mouth occupying the place of the removed bottom bars of the grate, and in the box was a moveable bottom, supporting the coal, by raising which the coal was lifted gradually into the grate to be consumed. The apparatus for lifting, however, was complicated, and liable to get out of order, which, with other reasons, caused the stove to be little used. The moveable bottom rested on a cross-bar of iron, which in moving was guided by slits in the side of the coal-box, and was lifted by chains at each end, drawn up by a windlass, and this windlass was turned by bevel wheels, of which one had to be moved by a winch in the hands of an attendant. Mr. Cutler was not aware that others had been engaged in the same pursuit, and took out a patent for his apparatus. A trial at law, however, afterwards decided that he had no patent right.

In the new fire-grate which I am now to describe I have sought in every part the greatest possible simplicity which could give complete efficiency. The combination is represented in the accompanying wood-cut, page 432. The charge of coal for the day is placed in a box immediately beneath the grate, as shown in the diagram at the letters *e f g h*, and is borne upwards, as wanted, by a piston in the box, raised simply by the poker used as a lever, and as readily as the wick of an argand lamp is raised by its screw; the fire is thus under command, as to its intensity, almost as completely as the flame of a lamp. There are notches in the piston-rod for the point of the poker, and a ratchet catch to support the piston when the lever is withdrawn.

The coal-box of an ordinary fire may have a depth of seven or eight inches, which will receive from twenty to thirty pounds of coal, according to the area. In winter an inch or two more depth of coal may be placed over the mouth of the box before the fire is lighted, and in warmer weather the box will not require to be quite filled, that is to say, the piston at the time of charging needs not to be lowered quite to the bottom. If it become desirable on any account, as will happen with kitchen fires, to replenish the coal-box in the course of the day, it may be done almost as easily as to put coal on a common fire; thus, when the piston has been fully raised, so as to have its flat surface flush with the bottom bar of the grate, *e f*, a broad flat shovel or spade, of the shape of the bottom of the grate, is pushed in upon the piston, and it becomes at once a temporary bottom to the grate and a lid to the coal-box. The piston being then allowed to sink down to the bottom of the coal-box, the spade or lid is raised in front by its handle, and opens the box, so that a new charge of coal can be shot in. The spade being then withdrawn, the combustion goes on again just as in the morning. That the opening of this lid may be wider, the second bar of the grate is hinged, and yields to the upward pressure of the spade.

This fire is lighted with singular ease and speed. The wood is laid on the upper surface of the fresh coal filling the coal-box, and a thickness of three or four inches of cinder or coked coal left from the fire of the preceding day is placed over it. The wood being then lighted, instantly ignites the cinder above, and at the same time the pitchy vapour from the fresh coal below rises through the wood-flame and cinders, and becomes heated sufficiently to inflame itself, and so to augment the blaze. When the cinder is once fairly ignited, all the bitumen rising through it afterwards becomes gas, and the fire remains quite smokeless ever afterwards. A fire-place supplied with coal from below was used by a distinguished engineer in town for ten years, and the fact that his chimney had not to be swept in the whole of that time, proved that no soot was formed.

In the new grate, because no air is allowed to enter at the bottom of the coal-box,—for the piston-rod fits its opening pretty accurately—there is no combustion below, but only between the bars of the grate, where the fuel is completely exposed to air, and near the mouth or top of the coal-box. The unsatisfactory result of some other attempts to make such a fire have been owing, in part, to the combustion extending downwards in the coal-box, because of air having been admitted below, and then consequent melting and coking of the mass of coal, so as to make it swell and stick, impeded the rising of the piston.

A remarkable and most valuable quality of this fire is, its tenacity of life, or its little tendency to go out or be extinguished. Even after nearly all the coal in the grate, surrounded by the fire bars, has been consumed, the air will dive into the coal-box and keep the fire there gently alight, like a torch burning from the top downwards, until nearly the whole contents of the box are consumed, and thus the fire will remain burning for a whole day or night, without stirring or attendance, and yet at any moment it is ready to burn up actively when the piston is raised.

In certain cases, as during long nights, it may be desirable to ensure the maintenance of combustion with rather more activity, and for this purpose there is a slide in a small door at the front bottom of the coal-box, by which a graduated admission of air may be allowed. That door itself is open before lighting the fire, to allow of the removal of any coal-dust or ash which has fallen down past the edge of the piston.

Before lighting the fire in the morning, the little ash which remains with this form of combustion is removed from off the piston.

The fire is extinguished at night by allowing it to exhaust itself, or by lifting out the few lumps of coke or caked coal which remain. The morning charge should

be such that enough cinder or coke may be left for the smokeless lighting of the next day.

By the means now described, then, the first-named evil of the *production of smoke* is effectually combatted.

2. Waste of Fuel.

We now come to consider whether the *waste of fuel* which occurs in common open fires can be prevented.

Count Rumford, as the result of his own experiments already referred to, declared that 5-6ths of all the heat produced in a common open fire passed up the chimney with the smoke, and therefore to waste; and he appealed in corroboration to the experience of the Continent of Europe, where close stoves are used, which do not thus waste heat up the chimney, and where a much smaller allowance of fuel than is here needed in open fires suffices. I have, in my own house, a striking illustration of the matter in a peculiar enclosed fire, which, for fourteen years past, in a large dining-room, has maintained, day and night, from October to May, a temperature of 60° or more, accompanied with good ventilation, by an expenditure of only 12lbs. of coal for 24 hours, or about a fourth of what would be used in an open fire burning for 15 or 16 hours. This fire is lighted about the beginning of October, and is not extinguished at all until the following May. The aperture by which the fresh air enters the stove to maintain the combustion sufficient to warm that room, is about three-quarters of an inch in diameter. If this be compared with the aperture of a common chimney-pot, which has a diameter of ten inches, and an area or size 150 times greater than my stove, and one thinks of the rapidity with which a column of dense smoke filling that pot escapes from it when the fire is burning briskly; and reflects further that such column consists entirely of the warmest air from the room, blackened by a little pitchy vapour from the fire, there is proof of prodigious waste, and room for reasonable hope that a saving is possible. To see how a saving may be effected, the exact nature of the waste in such cases has now to be explained:—A single mouthful of tobacco smoke, on issuing, immediately diffuses itself so as to form a cloud larger than the smoker's head, and soon would contaminate the whole air of a room, as would also the smoke and smell of wood, paper, or other combustible burned in a room. Now, the true smoke of a common fire is not the whole of what is seen issuing from the chimney top, but only little driblets or jets which shoot up or issue from the cracks in the upper surface of coal which forms the fire. These jets, however, quickly diffuse themselves, like the tobacco smoke, in the air around them, that is to say, in the large volume which fills the space left over a common fire, and over the hobs, if there be such, at the side of the grate. The whole of the air so contaminated, and which may be in volume 30, 50, or 100 times greater than that of the true smoke, is then all called smoke, and must all be allowed to ascend away from the room. It is evident, then, that if a cover or hood be placed over a fire, such as is represented by the letters *y a b* in the diagram, so as to prevent the diffusion of the true smoke or the entrance of pure air from around to mix with it, except just what is necessary to burn the inflammable gases which rise with the true smoke, there would be a great economy. This has been done in the new fire-place, with a saving of from one-third to one-half of the fuel required to maintain a desired temperature. In a room the three dimensions of which are 15 feet, 13½ feet, and 12 feet, with two large windows, the coal burned to maintain a temperature of 55° in the coldest winter days, has been 18 lbs. for 19 hours, or less than a pound per hour.

And it is to be remarked that not nearly the whole possible saving has been effected in the case referred to; for the grate was an old one imperfectly altered, and as the true smoke, little diluted, is very hot air when it leaves the ignited coal, and if it were made to pass, in contact with a vessel containing water or colder air, it would give up for use a considerable part of its heat. In many cases such saving will be profitably effected. Under the present imperfect forms of open fire, the whole of the hot smoke passes away as certainly as here, but at present is so much diluted with the colder air of the room, that ordinary observers do not perceive, and, consequently, do not regret, the fact.

In many cases the contraction of the space over the fire will be more conveniently made in brickwork than by a metallic hood. Where the hood is used, unless it be made a boiler or water-vessel, it should be lined with tile to prevent that overheating which would cause in the room some smell of heated metal.

The stalk of the hood at *y* passes closely through a plate or other stopping at the bottom of the chimney, so that no air shall enter the chimney but through the hood; and there is a throttle-valve or damper in the hood-stalk, at *t*, giving perfect control over the current of air that passes through. No part of the apparatus is more important than this valve or damper, and its handle or index must be very conspicuous, and have degrees of opening marked on its plate as clearly as the points are marked on a compass-card. When the valve is quite open, the chimney acts to quicken the combustion, like that of a blast-furnace, or like a forge-bellows, but, by partially closing the valve, the current may be diminished, until only the most tranquil action remains. The valve should not be open in general more than just enough to let all the burned air or thin smoke, which is scarcely visible, pass through. When the valve is once adjusted to the usual strength of chimney action, it requires little change afterwards.

In many cases it is desirable to be able to command and modify, by a moveable plate, the size of the front opening of the hood or fire-place, as well as the opening of the chimney throat. By the proper adjustment of the two, the desirable brightness of the front of the fire may be maintained.

The chimney-flue above the upper opening of the hood should have its sides made slanting, so as not to harbour dust or any soot which, from any careless use of the fire, might be produced. The size of the chimney flue is not important.

The answer then to the second question, as to the possibility of saving fuel, is by the facts here adduced, given in the affirmative.

3. Defects of Heating and Ventilating.

The third and last of the great evils of the present open fires is that there are great irregularities and deficiencies in their heating and ventilating actions, which bear so powerfully on the public health. The hood and its damper, as influencing these, may appear perhaps of more importance than as saving the fuel.

The hood and its damper, by allowing so small a quantity of air to pass through in comparison with what rises in an open ordinary chimney, lessens in the same degree the cold draught of air towards the fire from doors and windows, and which are common causes to the inmates of winter inflammation and other diseases; and for the same reason the heat, once radiated from the fire towards the walls of the room, not being again quickly absorbed and carried away by such currents of cold air as are referred to, remains in the room, and soon renders the temperature of the whole more equable and safe.

Still more completely to prevent cold draughts approaching from behind persons sitting around the fire, the fresh air for the room is conveniently admitted, chiefly by a channel which leads directly from the external air under the floor to the hearth, and there allows the air to spread from under the fender. The fender, exposed to the fire near it, becomes hot; the cold, fresh air then rising under it takes from it the excess of its heat, and so becomes itself tempered before it spreads in the room. The two evils of excess of heat and excess of cold, meet to neutralise each other, and to produce a good result.

The importance of general ventilation, again, is strik-

ingly exhibited by such occurrences as the following, which was related at the meeting of scientific friends at which I first described the new fireplace, by Mr. Robert Chambers, of Edinburgh, as having happened not long ago in Glasgow. A large old building, which had been formerly a cotton mill, was fitted up as a barrack or dwelling house for persons of the working classes, and had nearly 500 inmates. Like all foul and crowded human dwellings, fevers and kindred diseases soon became prevalent there. After a time a medical man who was interested obtained permission from the proprietors of the neighbouring chemical works, in which there was a lofty and very powerful chimney, to make an opening of one foot in diameter into the side of the chimney for the ventilation of the lodging-house. He then connected with this a main tube from the lodging-house, which had branches running along all the passages or galleries, and from the ceiling of every separate room a small tube communicated with these branches. Soon after, to the surprise as well as to the delight of all concerned, severe diseases entirely disappeared from the house and never returned.

Now the chimney of the new fireplace, although not very tall, has a ventilating power scarcely inferior to that of the Glasgow chemical works. The arrangement of the hood with its valve, as above described, by allowing only unmixed and very hot smoke to enter the chimney, instead of, as in common chimnies, smoke diluted with many times its volume of colder air, increases the draught just as it does the heat of the chimney, and through an opening then made into the chimney from near the top of a room, all the hot, foul air in the room, consisting, perhaps, of the breath of inmates, smell of meals, burnt air from candles, lamps, &c., and which else accumulates and stagnates at first near the top of the room, is immediately forced into the chimney and away. This is strikingly proved by placing near the ventilating opening a light body, as feathers or shreds of paper suspended to a thread, and seeing with what force it is drawn into the opening. In the diagram the opening is represented at the letter *v*, having the common balanced chimney-valve in it, which, by the wire descending to a screw within reach of the hand, can be left open to any desired degree.

That valve I recommended many years ago, and its use has become pretty general over the country, but, in many cases, what I described as an essential concomitant—the contraction of the chimney-throat and the space over the fire—has been omitted, and the proper action of the valve has been prevented.

This is what I had to say on the correction of the third of the great evils of the common fire, and I hope it has been shown to be possible to construct an open fire-place, scarcely differing in appearance from an ordinary English fire-place, with its pleasing asssociations, but which shall be smokeless, saving much fuel, and ensuring the healthful warmth and ventilation of our houses.

There are yet subordinate advantages of the new arrangement of fire-place, among which the following may be noted:—

1. Chimney-sweeping can scarcely be wanted where there is no soot.
2. Chimney-flues without soot cannot catch fire, and, if fire were in any way there introduced, by shutting the hood valve it would be certainly extinguished. Thus a large proportion of the conflagrations of buildings may be avoided.
3. The huge evil (almost universal) of smoky chimneys cannot occur with this grate.
4. The occasional sudden rush of air towards a hot wide chimney, when the door is opened, and which carries readily the light muslin dress of a lady towards the grate and inflames it, cannot happen with this grate.
5. The danger of sparks from exploding pieces of coal thrown on the carpet does not exist here, for all the coal is first heated and coked while deep in the coal-box, and covered over. Thus a fire-guard is not wanted on this account.
6. The strong draught of a voracious fire in one room, or in the kitchen of a house, cannot disturb and overcome the action of other chimneys in the house, as is now very common.
7. The strong draught of any well-constructed fire-place may, by a connecting tube be made to ventilate any distant rooms, staircases, cellars, closets, &c.
8. The strong and copious draught caused by momentarily opening the hood-valve or damper will prevent the diffusion of dust when the fire is stirred or disturbed.
9. The chimney-valve, by its powerful ventilating effect, obviates all objections to the use of gas-lights in houses, thus leaving the beauty, cleanliness, cheapness, and many conveniences of gas unmarred. Explosion from accidental escape of gas in a room or house, of which occurence there have been some destructive instances, cannot happen where there is the ventilating chimney valve, for cold coal-gas entering a chimney-flue produces a more powerful draught than hot air does.
10. The improved chimney draught in attic or upper rooms will make these more valuable, and will increase the comfort of low houses and cottages.
11. It would, moreover, be convenient occasionally to carry the flue of a close stove, or bath, or the ventilating tube from lamps in staircases into any acting chimney.
12. This torch-fire (as some have called it, because it burns from above downwards, like a torch or candle) is remarkably adapted also for the purposes of the kitchen.
13. The change of any existing grate of an old fashion into this is easy and inexpensive, and by having a piston-plate with holes it can be used as a common grate.
14. Any kind of coal or coke may be used in this grate, even the small culm or coal-dust, which is very cheap. In a common grate, coke or Welsh stone coal would be objectionable, because containing chiefly heavy carbonic acid instead of the steam and carburetted hydrogen of bituminous coal, and the gas, which is poisonous, might spread in the room, but by the strong draught of the hood this could not happen.

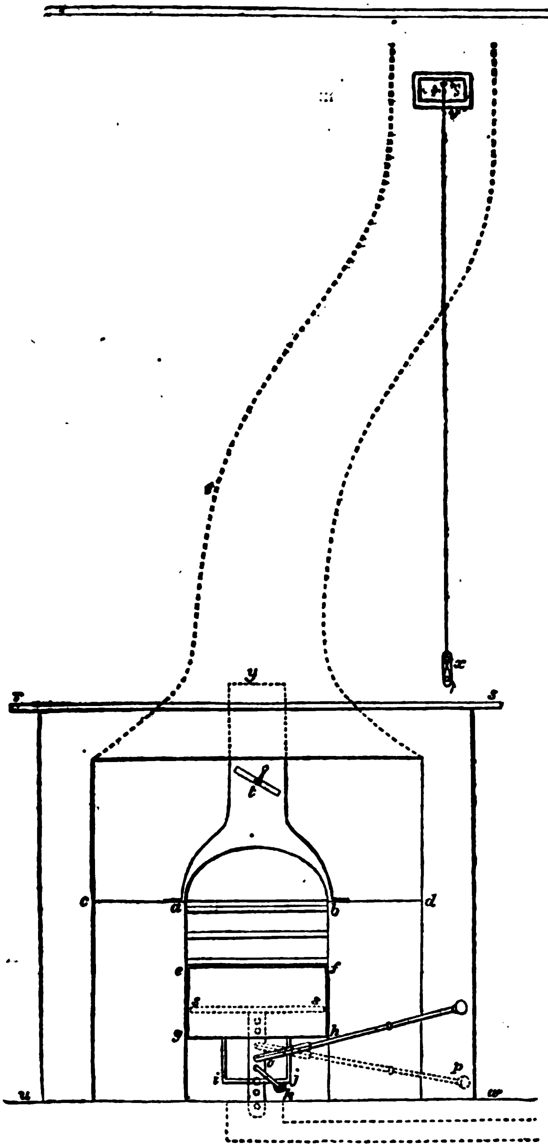
I might extend this list, but I need not.

Before concluding I may direct attention to the remarkable fact, only of late well understood, that of the only four great necessaries of life, or things which Providence has left to man in various parts of the earth to procure for himself, namely, fit air, temperature, aliment, and work alternating with rest,—the skilful management of a domestic fire goes far to secure the two first-named, viz., fit air and warmth, but these are the last which men come to understand well, because they are invisible and impalpable, and, therefore, to be perceived only by the eye of the mind after much cultivation.

EXPLANATION OF THE DIAGRAM (*See page* 432).

It represents a common fire-place with mantel, *r s*, or chimney piece, two jambs, and a common grate with two bars and bottom, to which four parts, the essentials of the new fire-place, are added. *e f g h* is a box or receptacle of iron to contain the charge of coal for the day, with its open mouth placed where the bottom bars of the grate had been. It may stand on feet on the hearth, or may be fixed to the grate. Besides its fixed bottom, *g h*, it has also a moveable bottom, *s s*, like a piston, on which the coal immediately rests, and is lifted as wanted, or let down as the piston moves; a piston-rod passes through the fixed bottom, steadied by a guide-hole in the stirrup or bar, *i j*, below. The piston-rod has notches or openings in it to receive the points of the poker, *p o*, which, acting as a lever, having its fulcrum in the foot of the box or otherwise, lifts the piston. A catch or pall, *k*, falls into the notches as the piston rises, to prevent its return until desired.

In the centre of the bottom front is a door, which is opened at will to admit a little air if wanted, or for removing small coal or ashes which falls past the piston. Where the grate is set low a small opening is made in the hearth to allow the end of the piston to descend.



a b y is a hood or cover for the fire, like an inverted funnel opened in front, placed over the fire to contract the open space there, and to receive the true smoke of the fire and convey it little diluted into the chimney-flue at *y*.

t is a valve or damper, placed in the narrow part of the stalk of the hood to give complete control of the current of air passing through. There is an index externally, showing clearly always the position of the valve.

y v marks the direction of the chimney-flue in the wall, having generally to bend to one side to avoid the fireplace of the room immediately above.

v is the ventilating chimney-valve, admitting air from near the top of the room to the flue, balanced nearly on its centre of gravity so that the least pressure from without opens it inwards, but any pressure from without, as of smoke, closes it. There is a wire descending from the valve, with a screw or loop-peg, for partially or wholly closing it.

There is a channel underneath the hearth by which fresh air, directly from the atmosphere, enters the room, to be warmed under the fender or near the fire, and then to spread in the room. It has a controlling-valve.

DISCUSSION.

The Chairman said that as the Society had recently spent two evenings upon the discussion of furnaces for steam engines and manufactories, the subject for their consideration this evening should be confined to fire-places for domestic purposes. It was in respect of the almost total freedom from smoke that the common household fire of Dr. Arnott would be considered popularly interesting. Now smoke, like other dirt, had been defined as merely matter in a wrong place. The true place for the products of combustion was to perform a great function as transparent gases in the atmosphere. The habits of civilization increased population rapidly, and an augmented vegetation was required for their support. Now, by the very habits of civilisation, the ancient vegetation of former times, now in the form of coal, was exhumed, and, after being used in our fire-places, was again thrown into the atmosphere to promote vegetable growth, required by that population which thus artificially compensated for its own increase. The chairman stated that he had often thought that we were coming to a time when gas would be to a great extent used for domestic fire-places, and the coke thus formed in large quantities, and offered at a cheaper rate, would be employed for manufacturing purposes, thus producing smokeless fires in both cases. Now, Dr. Arnott's fire-place effected this combined object by one operation. The part of the grate under the bars into which the coal was placed, became, in fact, a gas retort, which gave out a gas that burnt mainly at the top, whilst the coal underneath being now coked, was raised into the fire-place, and also burned without smoke, but with great brightness. The arrangement by which he prevented a large unnecessary draft of air passing up the chimney, whilst it economised fuel, improved the sanitary condition of our rooms, by preventing the dangerous currents of cold air. Besides all these scientific advantages, the fire itself was of a genial home character, and did not run counter to our present prejudices. A witty archbishop had been stated to have defined ladies as creatures who could not reason, and who poked the fire from the top. However untrue the first part of the definition might be, the last certainly coincided with fact, and any fire-place which presented obstacles to the gratification of this propensity would have little chance of succeeding with the superior authorities at our homes. But Dr. Arnott's fire-place in appearance could scarcely be distinguished from those in common use, while it possessed advantages much superior to them.

Lord Ebrington being called upon, pleaded his unpreparedness to speak before so many scientific men, but felt bound to pay a tribute to Dr. Arnott's generosity and public spirit in presenting this, as he had all his previous valuable inventions, gratuitously to the public. His attention had been much called lately, at Paris, by one of the most eminent French military medical men, to the disease and mortality resulting from the defective ventilation of the barracks and hospitals there; a complaint, he feared, almost as applicable to our barracks and hospitals as to those of the Continent. There were various great advantages in the grate before them, but he was delighted to find Dr. Arnott speaking of it as an invention, to the successful use of which the addition of a ventilator was indispensable, while the use of his ventilators without the contraction of the chimney's throat, exhibited in the hood of his grate, was always liable to prove, as it had too generally proved, a failure; with the new grate there would be no fear of the ventilator's not acting. The absence of draught to his grate, valuable on all accounts, was doubly valuable in London, where, owing to the defective condition of our sewers, a powerful draught to the grate was liable to cause us to ventilate our sewers through our living rooms. Living as he did in a house the chimneys of which not only smoked themselves, but frequently, when no fire was lighted under them, sucked down the smoke from the chimneys with fires, and introduced it into the house through fireless rooms, he could well appreciate the

comfort of an invention which put an end to the smoke of domestic fires altogether.

Mr. ELDRIDGE said he had sent a drawing of a stove to the Society, which he called a rotatory wheel stove, which was exactly on the same principle as Dr. Arnott's, that of distilling the gases through the incandescent portion of the fire. Supposing the fire to require feeding, green coal was placed in the top part of the grate, which was then turned half round, so that the green coal occupied the lower portion. He considered they ought to have a fire which could be put out immediately; this might readily be accomplished by the wheel stove. He also recommended the use of brick backs, brick sides, and brick bottoms, to ensure durability as well as to increase the amount of heat.

Mr. LEE STEVENS said he, too, had invented stoves, but he thought they were not called upon then to discuss his inventions or any other persons. Dr. Arnott's invention deserved much more consideration; but while Dr. Arnott gave his invention freely to the public, he (Mr. Stevens) intended to turn his stoves to his own advantage as well as to that of the public. He had come to the conclusion that it was of importance that manufacturers of furnaces should have a sufficient number of patterns ready, so that new orders should not require new patterns. He thought some of these might be in a very ornamental style. He believed moreover that the old grates might be adapted to Dr. Arnott's principle by an outlay of 25s., or 30s.; and grates for very common purposes might be so adapted at even a smaller cost. He could confirm what Dr. Arnott said about the radiation of heat. He had himself been recently adapting a mode of smoke-prevention to bakers' ovens; many of the bakers said he had improved the baking capacity of their ovens; and he had attained that result by placing the fire some two inches above the level of the floor of the oven.

Dr. HOFMANN stated that it would be difficult for him to add anything to the remarks of his friend, Dr. Playfair, on the paper they had just heard, and to his eloquent and perspicuous exposition of the scientific principles involved in Dr. Arnott's invention. But having had the good fortune not only of seeing the new fire-place in its perfect state, but of watching its gradual elaboration, he had had ample opportunities of appreciating all the difficulties which presented themselves, and of witnessing the perfect success with which they were overcome. He considered Dr. Arnott's new grate as a happy combination of whatever was desirable in a fire-place. There was one point on which he had been apprehensive, and this was the brightness of the fire; but in this respect, too, the new arrangement had proved eminently successful. If the supply was properly managed, the intensity of the light emanating from the seat of combustion was not only equal, but actually superior, to that of an ordinary fire-place. The reason was the large mass of solid matter (coke), kept in a state of full incandescence in the flame of the gas generated at the line of contact between the ignited fuel and the fresh supply. The same principle had been lately applied in a very elegant contrivance of Professor Steinheil, in Munich, who had proved, by a series of very accurate photometric measurements, that the illuminating effects of a gas flame might be raised to double and even treble its ordinary amount, simply by appropriately introducing a solid substance (a wire of certain dimensions), into the lower portion of the gas-flame.

Mr. ROBERT HUNT had but few remarks to make. Dr. Arnott had so clearly explained all the conditions involved in effecting the combustion of the carbon escaping from bituminous coal in an open fire-place, that it was quite unnecessary to say a word on this point. The mechanical arrangements appeared so exceedingly simple, that he conceived there would be but little difficulty in adjusting the coal—containing box, &c., to any fire-grate at present in use, and that too, as had been stated, at a very small cost; certainly every one who had considered the subject must feel much indebted to Dr. Arnott.

Mr. D. K. CLARK* found that the statements of Dr. Arnott with respect to the phenomena of domestic fires exactly tallied with his own experience of the working of the larger fires of furnaces. It was well understood that the best form of chimney for steam-boiler furnaces, was that in which the chimney was widened in its horizontal section towards the top; when the entrance to the chimney was sufficiently wide for the passage of the smoke, and the widening of the passage upwards facilitated the ascent of the smoke, and strengthened the draft. Similarly Dr. Arnott preserved undiminished the internal section of the domestic chimney, and left it wide and easy for the ascent of the smoke, while he very much contracted the throat or entrance of the chimney over the fire-place. There was also the collateral benefit of more perfect combustion, due to the acceleration and concentration of the draft claimed by Dr. Arnott, and confirmed by Dr. Hofmann, in his remarks on the peculiar brightness of the incandescent fuel due to the superior draft. Mr. Clark had much pleasure in testifying to the advantage of a rapid, or rather intense draft, in perfecting the combustion and extinguishing the smoke. This was the panacea he constantly held forth for the universal prevention of smoke in large furnaces, as he had often witnessed the power of an intense draft in preventing smoke in locomotive boilers, when properly taken advantage of. He confessed he had not clearly seen how the specific could be made available in domestic fires, until hearing from Dr. Arnott the simple plan he had devised; and he added that when the same principle appeared to prevail in such extreme cases as domestic fires and locomotive furnaces, the pleasing probability was that the doctrine of intense drafts and perfect combustion, *versus* sluggish drafts and the production of smoke, was a sound one, and founded in nature.

Mr. E. CHADWICK, C.B., in moving that thanks be given to Dr. Arnott for the communication of his simplification of a most important invention, and for his clear exposition of its principles, said that it was necessary that steps should be taken to make the relative magnitude of the subject duly understood. Its importance to health had been fully stated. But if with that the pecuniary economy at issue were duly impressed upon the public, there would be anti-smoke leagues, and subscriptions, and agitations in aid of such legislative measures as might be obtainable for their protection. To go at once to the case of the poorest classes. The fuel for the most wretched grate costs, at the least, a shilling per week. A manufacturer fully competent to give the assurance, Mr. Lee Stevens, had that night stated to them that the invention might be effectually applied to common grates at a rate of less than one pound each. Now, whilst half the poor man's fuel was saved, or a double warmth was given to him for the same expenditure of money, the outlay for the new appliance would be repaid from the saving of fuel alone in less than half a year, whilst his neighbours, as well as himself, would achieve a still greater saving in the expense of washing and the wear of clothes, that was provided, as to this branch of saving, that the application of the improvement was made general. The consumption of fuel in the metropolis was returned in 1841 as 2,566,899 tons. During the last thirteen years it was estimated to have increased to upwards of three millions and a half of tons. At 17s. per ton, the saving in fuel alone, by the general adoption and the prosecution of the means placed at their disposal, which they were assured were applicable to every description of range as well as grate, would be nearly a million and a half per annum. But the most important saving was, in saving the expense of washing. Any one who did duty amongst papers in a London office, and who went to live in a detached house in a rural district, by observation of the length of time during which linen kept clean in a detached position in

* Time did not admit of Mr. Clark's making these remarks, which he has subsequently forwarded to the Secretary.

the country, though it might have its share of the cottage smoke, as compared with the time during which linen was useable in any part of London would be fully convinced that the entire abolition of the smoke nuisance from the domestic grate and range, as well as from the manufacturers, furnaces, would effect a reduction of more than one-half the expense of washing, as well as of the wear and tear of linen. He had some time ago occasion to enquire what those expenses were; he found that to the middle classes they made one-twelfth or one-thirteenth of their income, often about half the rated rental of their houses; but taking all classes, high and low, those expenses could not be averaged at less than one shilling per head, per week, on the population, or to the two millions and a half of the metropolis, the washing bill was not less than £5,000,000 for the year's washing. On some points of the estimated saving there might be deductions, but on others there would be additions to be made, and, extravagant as it might appear to those who had paid no attention to the subject, the pecuniary economy in washing as well as in fuel, obtainable by the total abolition of the smoke nuisance, was understated at three millions per annum to the metropolis alone. If Lord Palmerston was duly supported in the abolition of the nuisance to private households as well as in the abolition of the smoke nuisance, a saving would be effected of double the contribution which the Chancellor of the Exchequer was obliged to require from the metropolis by malt tax and other taxes in support of the war. Smoke nuisance from the furnaces was, in the aggregate, the lesser evil, and the sources of the lesser economy, but the economy of heat and power, as well as of smoke from the manufactories, was only at its commencement. At the discussion on smoke furnaces, Mr. Wilson, of Price's Candle Company, had stated the economy observed, from the trial of various furnaces, only at 11 per cent. of fuel; but in returns obtained by direction of Lord Palmerston, a considerable number of private owners, who had adopted smoke-consuming apparatus of various kinds, an average economy of 17 per cent. was stated, and, in some instances, an advance to 25 per cent. of economy was admitted, together with the repayment of the outlays within short periods. In those discussions it was a common objection that they should not do one thing until another thing, which appeared to be improbable, was also done. It was objected that no good, that nothing of any consequence, would be done by compelling manufacturers to adopt measures for smoke consumption until similar compulsory measures were adopted towards the domestic fires. It appeared to him that the prevention of the smoke nuisance by the disastrous strike at Preston would afford some test of what might be accomplished by Lord Palmerston's measure of compulsory economy upon manufacturers, and he had requested his friend, the Rev. Mr. Clay, the Chaplain of the prison at Preston, to make inquiries for him. The following was his answer:—"I have made numerous inquiries among respectable families of the operative class, and among the washerwomen who assist at the houses of the middle and lower classes; the *general* result is, that the discontinuance of the smoke was *at once* recognised as a great benefit by every woman who has to *hang out* her clothing to dry. The 'blacks' not falling, there was no necessity for washing clothes over again; the linen keeping cleaner when worn did not undergo so much scrubbing and wearing in the process of washing; and the quantity of soap used decidedly diminished. I made some inquiry also among the soap-dealers as to any change in the rate of demand for the article. They are sensible of a decided falling off, but the demand for everything has diminished, and it would be difficult to separate the decreased demand for soap arising from the decreased necessity for using it, from the decreased demand arising from want of means to purchase it. On the whole I feel satisfied that, comparing the washing of the town under factory smoke with its washing when free from it, as it has been for nearly six months, the saving in respect to the scrubbing of the clothes may be stated by saying, that the clothes will last 15 months where they only lasted 12; and that the cost of soap would be lessened to the amount of from 25 to 35 per cent." Mr. Chadwick then recommended to the members of the committee of the Society for Improving the Dwellings of the Working Classes, and the members of the committee of the Association for the Improvement of the Dwellings of the Labouring Classes, the immediate application of the invention to their model dwellings. Impressed with the great importance of the economy of fuel and the prevention of smoke to the whole population, and knowing that in France as well as in England, there had been much attention paid to the improvement of domestic fire-places, and much unsuccessful invention, which had only failed in getting notice, he had suggested the necessity of trial works to determine experimentally the relative efficiency and economy of each method, authentically and impartially, for the public information. He had thought also that medals would be well applied for the same purpose. But the success of the old invention, now revived and simplified and cheapened, appeared to be so decisive as to leave nothing now to be desired but extensive and practical measures to ensure its adoption.

Mr. Ellis seconded the motion. He said it was well known to all, the immense numbers of people who now lived in this country and the comforts they enjoyed, as contrasted with former periods. They must have a stock of what was called wealth, to enable those numbers to live. They might talk of victuals, and clothing, and luxuries, but they could not do without heat. The best known material for producing heat was coal: and in producing that heat it was very desirable to have some mode of avoiding the creating of smoke. Now Dr. Arnott's exposition appeared to him so convincing that he saw they could have a very largely increased supply of heat out of the same quantity of material as was now used. He cordially seconded the motion of a vote of thanks to Dr. Arnott.

The Chairman, in putting the motion from the chair, added his testimony to the great value of Dr. Arnott's invention, which, he said, was so complete that with it people could almost whitewash the interior of their chimneys; and chimney sweping, and the cruelties thereof, which were still practised in the provinces, would be done away with. He then put the motion, which was carried with acclamation.

Dr. Arnott said he was gratified to find that the remarks generally made by different gentlemen who had addressed the meeting were in approbation of his invention. He had nothing more to say but to return his warmest thanks for their kindness.

The Secretary announced that the Paper to be read on Wednesday next, the 17th instant, would be "On Visual Education, as applied to Geology; illustrated by Diagrams and Models of the Geological Restorations at the Crystal Palace," by Mr. B. Waterhouse Hawkins, F.G.S., F.L.S.

ON A METHOD FOR PRESERVING THE SENSITIVENESS OF COLLODION PLATES FOR A CONSIDERABLE TIME.

By John Spiller and William Crookes.

(From the *Philosophical Magazine.*)

The extreme sensitiveness of collodion as compared with paper and other photographic surfaces, renders this material invaluable in all cases were rapidity of action is desirable, but up to the present time its use has been greatly restricted by the necessity for preparing the plate and completing the whole of the manipulatory details within a comparatively short space of time, thus rendering this

beautiful process practically inapplicable in all cases where the conveniences of a phothographic laboratory are not at hand.

For some time past we have been investigating the causes which operate to prevent the excited plate retaining its efficiency for more than a few hours. It seemed highly probable that the permanent sensitiveness of the film was principally dependent on the retention of a moist surface; and if by any artificial means this end could be secured, the original sensitiveness of the film would be, for at least a reasonable time, preserved unimpaired.

The only attempts up to the present time to effect this object are, we believe, that of M. Girod*, who proposes to enclose the sensitive collodion film between two plates of glass, with only so much of the exciting silver solution as might be retained by capillary attraction; and thus by retarding the evaporation of the water, to keep the surface moist, and consequently sensitive, for a longer period; and secondly, that of M. Gaudin†, who suggests the use of perfectly air-tight dark frames or boxes, in which a number of the wet plates could be arranged in a horizontal position, and there kept until required. Besides these two methods, it is well known that the plate will remain excited for a considerable time if kept immersed in a solution of nitrate of silver; in fact, a glass bath in the camera has been often used in cases where the length of exposure was likely to be too prolonged to admit of the plate being placed in the ordinary slide.

Instead, however, of having recourse to a mechanical means for preventing the evaporation from the surface, we have endeavoured to avail ourselves of a chemical process, by the employment in the bath of substances having a powerful affinity for water: in the choice of these, however, we are necessarily limited to such as are neutral in constitution, and do not form insoluble compounds with silver. The nitrates and acetates, especially the former, seemed most convenient for our purpose on account of their general deliquescent nature, and for our first experiments we selected the nitrates of lime, magnesia, and zinc, as most promising of success. These agents were at first tried in the above-mentioned order; but from a few preliminary trials we were inclined to give the preference to the zinc salt, and, having obtained such satisfactory results with its use, are induced to communicate them at once rather than withhold them until our investigation of the other compounds shall have been completed. At first we endeavoured to add the nitrate of zinc direct to the exciting bath, but the quantity required to prevent so large an amount of nitrate of silver from crystalising out on the plate rendered the solution too dense to work with.

The following process can be recommended as having proved perfectly successful in our hands; we do not doubt that with more general use it may be considerably modified and improved, but at present we have rather contented ourselves with establishing the broad principle with such details only as will suffice to ensure good results, and to leave to a future period the consideration of those minor points which only a long experience can develope.

The plate, coated with collodion (that which we employ contains iodide, bromide, and chloride of ammonium, in about equal proportions), is made sensitive by immersion in the ordinary solution of nitrate of silver (30 grains to the ounce), and after remaining there for the usual time is transferred to a second solution of the following composition:—

Nitrate of zinc (fused) . . .	2 ounces.
Nitrate of silver	35 grains.
Water	6 ounces.

The plate must be left in this bath until the zinc solution has thoroughly penetrated the film (we have found five minutes amply sufficient for this purpose, although a much longer time is of no consequence); it should then be taken out, allowed to drain upright on blotting-paper until all the surface moisture has been absorbed (about half an hour), and then put by until required. The nitrate of zinc, which is still retained on the plate, is sufficient to keep it moist for any length of time, and we see no theoretical or practical reason why its sensitiveness should not be retained as long; experiments on this point are in progress; at present, however, we have only subjected them to the trial of about a week; although at the end of that period they were hardly deteriorated in any appreciable degree. It is not necessary that the exposure in the camera should be immediately followed by the development, as this latter process can be deferred to any convenient opportunity provided it be within the week. Previous to development, the plate should be allowed to remain for a few seconds in the original 30-grain silver-bath, then removed and developed with either pyrogallic acid or a protosalt of iron, and afterwards fixed, &c. in the usual manner.

The advantages of this process can scarcely be overrated. Besides the facility it affords of working in the open air without any cumbrous apparatus, photography may now be applied in cases where it would have been hitherto impracticable, owing to the feebleness of the light, *e. g.* badly illuminated interiors, natural caverns, &c.; if necessary, the exposure could be protracted for a week, or possibly much longer, and the deficiency of daylight compensated for by the employment of the electric or other artificial light. It will also be found useful where the plate must be kept ready excited, but the exact moment of exposure may depend upon possible contingencies rather than on the will of the operator, or in cases where it would be impracticable to prepare the plate just before exposure; for these reasons it might prove a valuable adjunct on the eve of a naval or military engagement, for accurately recording the positions of the forces.

A small proportion of nitrate of zinc added to the ordinary nitrate of silver bath in no way interferes with its action, and might obviate the inconvenience sometimes felt during hot weather in photographic rooms, of the film becoming partially dry before exposure. If added in a still smaller proportion to the silver solution used for exciting the ordinary Talbotype paper* (without the employment of gallic acid), it is very probable that its sensitiveness may be preserved during a much longer period than is generally possible. As far as our experiments have gone, they tend to confirm this supposition; but at present we can hardly speak more confidently on this point, as it is still under investigation.

There are, no doubt, many other substances which might equally well answer the purpose of nitrate of zinc; besides those already mentioned, the nitrates of cadmium, manganese, and perhaps also those of copper, nickel, and cobalt might be found serviceable. Glycerine at first seemed to promise very good results, but the principal difficulty was the necessary impurity of the commercial product, in consequence of its being obtained from the exhausted leys of the soap boilers.

POSTAL REFORMS.

The Chancellor of the Exchequer, in his speech on the Budget the other evening, made the following remarks on this subject:—

"In the first place, there is one subject that *prima facie* might be supposed open to the consideration of a Minister of Finance driven to his wit's end to invent a new source of revenue, and that is an alteration in the rates of postage, because an alteration in the rates of postage would have this advantage—that the whole increase would be a net increase, while, on the other hand, the expenditure

* Journal Phil. Soc. No. 9. †Ibid. No. 10.

* This addition of nitrate of zinc to the silver solution in the *Talbotype* process was suggested, we have been informed, some time back by the French, but not with reference to its keeping properties—only as an accelerator.

would probably even be diminished. But the Government is not disposed to propose any such alteration. We think that that scheme has been admirably successful—that it has contributed in a greater degree than even the most sanguine could have anticipated to the comforts of the people—that it has been a great civilizing and humanizing project—that its moral advantages are not less striking than its economic principles—and that in a fiscal point of view it has more than answered the expectations that were formed regarding it; for while in 1840 the net proceeds of the postage revenue was 447,000*l.*, in 1846 they had risen to 845,000*l.*: and in 1853 to 1,104,000*l.* It may be recollected that in the year of the Great Exhibition the addition to the postage of the country was so enormous that a reaction in the revenue was naturally expected; but if you look over the list of annual proceeds since, you can scarcely detect which was the year of the Exhibition, so rapid and so steady has been the growth of the receipts under this most desirable and most advantageous system. The doubling of the postage, unless it were extended to the district posts, would not bring in more than 600,000*l.* a-year; to extend it to the district post it would not be more than 700,000*l.*; so that, even under the present circumstances, the Government are of opinion that it would not be wise to attempt any change with respect to postage, except such change as would tend further to extend the comfort and accommodation of the public. They have lately succeeded in making further arrangements that would render interference at the present moment peculiarly unseasonable. A most valuable public servant, a man of unimpeached honour, of great assiduity, and of excellent abilities, who was Secretary for the Post-office at the time this change was effected, has continued Secretary till the present time, and now retires from his office to another post in the public service, with the full confidence and approbation of all those whom he has served. But, without disparagement to any one, it must be obvious to the committee that there is a great advantage in placing the postage system under the care and superintendence of the gentleman who has the happiness of thinking that he stands regarded before the world, and that his name will be handed down to posterity, as the author of that system. Mr. Rowland Hill, within the last few weeks, has assumed the office of Secretary of the Post-office, and though the advantages of the system have been extended with great rapidity heretofore, yet, from his parental fondness for that system, and his great abilities, we may be justified in anticipating for the future a still more rapid increase than the country has ever seen or supposed possible.

Home Correspondence.

DECIMAL COINAGE.

SIR,—I should be much obliged if you would allow me to correct a mis-statement I made on Wednesday. I intended to say, 1d. 2f. of 10f. to 1d. present value = to 1d. new; consequently, the new penny = 12f.. and 10 of these pence would make a shilling, the decimal required.

Yours respectfully,
FREDERICK WILSON.

FLAX AND ITS PRODUCTS IN IRELAND.

CONTRIBUTED BY WM. CHARLEY, SEYMOUR-HILL, BELFAST.

LETTER VIII.

From the time that the Linen Board was dissolved by Parliament till the establishment (in 1841) of the Flax Improvement Society of Ireland—a period of thirteen years—the production and manufacture of the flax plant was left without almost any other guardian than the intelligence of the parties engaged in its conduct and management for their own private interests. Some few of the Provincial Agricultural Societies, no doubt, awarded premiums for good flax, but merely as a portion of the "farmers' crop," and not in the broad light of a national production and manufacture. The Royal Dublin Society, also, offered for competition, at their triennial exhibitions, prizes for the best specimens of Irish linens of different qualities and classes. There appears, however, to have been an evident want of some substitute for the great central Linen Board during this period; some Society to watch over and protect, in a national spirit, the general interests of the flax-growing and manufacturing community; to introduce, after proper trial, improved modes of operation; and to collect statistics on which to base calculations and confirm facts.

It certainly does appear to be a great pity that so many years were allowed to elapse before this void, so long felt and admitted by all, was filled up; years during which numerous important changes took place in the manufacturing process, more especially in the preparation of the fibre. During this period the old systems of hand-scutching and hand-spinning at home, and the selling of the linens in the markets by the *weavers*, were quite revolutionised.

The number of scutching-mills in the country had greatly increased,* and the flax prepared therein commanded such a preference, that hand labour in this branch was much less in vogue. For spinning the yarn very perfect machinery, driven by the powerful steam engine, was also introduced, and this so completely outrivalled in economy and regularity the handspun productions, that in all (except a few of the very fine) numbers the handspun yarn was speedily driven out of the market.

The Messrs. Mulholland were. I believe, the first proprietors of flax-spinning machinery in Belfast. Their establishment was erected about 1828, and was managed so well and so successfully that the owners amassed large fortunes. For some years these gentlemen enjoyed almost a monopoly, but soon other parties entered into the thriving and consequently attractive business, and many new mills were built both in the town and country. The Messrs. Murland, of Castlewellan,† and Messrs. Dunbar and Co., of Gilford, were among the most intelligent and most prosperous of the spinners not carrying on their trade in the town of Belfast. They both relied on the production of the best quality of yarn suitable for the home trade, while the majority of the Belfast spinners devoted their attention to the lighter and less expensive qualities used in making goods for export to warmer countries.

It is stated that at present there are about 80 flax spinning mills in Ireland, and that these contain fully 500,000 spindles, producing, if worked ten hours a day, fully nine millions of bundles of yarn per annum, worth about £2,250,000 at a moderate valuation. One can hardly fancy how the large quantity of yarn in use was made before the system of spinning by machinery was known and carried out. What an immense number of fingers and spinning-wheels would be required to turn out of hand the amount of yarns I have just stated! Yet, without doubt, a very considerable amount of hand-spun must at one time have been produced, to judge by the value of linens exported, and the quantity of flax grown. I here beg to give the number of acres of flax sown for some

* It may be interesting to state that the number of scutching mills in Ireland in 1852 (as furnished by the Government Returns) amounted to 956, containing about 5000 stocks, and driven chiefly by water power.

† The Messrs. Murland dispute priority with the Mulhollands as to which party first erected spinning machinery for flax in Ireland. Be this as it may, these two highly respectable firms without doubt started their mills *within the same year* (1828). The Messrs. Murland are considered the first spinners in Ireland for prime quality, and the Messrs. Mulholland are proprietors of the largest mills and most machinery.

years, as near as could be ascertained by the best authorities at the time:—

1812 — 73,000	1820 — 91,000	1847 — 58,000
1813 — 52,000	1821 — 80,000	1848 — 53,000
1814 — 62,000	1822 — 86,000	1849 — 60,000
1815 — 91,000	1823 — 95,000	1850 — 91,000
1816 — 93,000	1824 —112,000	1851 —138,000
1817 — 57,000	1825 — 86,000	1852 —139,000
1818 — 83,000	1826 to 1846 not known	1853 —175,000
1819 — 77,000		

Between 1826 and 1846 the quantity appears to have been gradually falling off, and this became so evident to all intelligent people, that fresh efforts were used to extend the beneficial influence of the new Flax Society throughout all the provinces of Ireland. The result of these efforts have been most satisfactory; in six years from 1848 the number of acres under culture was increased *three fold!* The Royal Flax Society of Ireland, established in 1841, has now been in existence 13 years. The Queen and Prince Albert are Patrons of the Society, and the Lord-Lieutenant of Ireland, Vice-Patron; the Marquis of Downshire, President; so that it has the advantage of the noblest patronage and support. It has been fortunate enough also to procure the services of a talented and active secretary (Mr. M'Adam). On certain conditions as to expenditure, it receives from Government, through the Lord-Lieutenant, a sum of £1000 a-year, which, with local donations and subscriptions, provides the necessary funds for defraying the expenses of the Society. These expenses consist mainly in keeping up a staff of instructors conversant with the best modes of culture and management; these instructors proceed to various parts of the country as required, and give advice gratis to landholders who may be anxious to grow the plant on the best system. There is no better way of improving farmers than that of bringing them into contact with *practical* reformers. Agriculturists often have a dread of what they call "book farming;" but when they hear a man explain clearly the improvements to be carried out, they are much more likely to adopt them, and much more sanguine of success.

These instructors have been highly useful in the spread of correct information regarding the flax crop. I may also say that the constant attention given by Mr. M'Adam to the interests of the Society, and the yearly and monthly meetings of the members and Council for the purposes of discussion and consultation, contribute greatly to keep the spirit of improvement alive, and act as a gentle and healthy stimulus to exertion throughout all the branches of flax cultivation and manufacture. I have said the system of selling in the markets by the weavers was much altered between 1826 and 1846; the change was similar to that effected about the same time, I believe, in the Cloth Halls of Leeds, Manchester, and other places in England, and followed, as a necessary consequence, the introduction of large mills for spinning the yarn. This change consisted in the gradual disappearance of the petty manufacturers, and the substitution, in their stead, of a class of large manufacturing capitalists, some of whom combined the spinning of the yarn with the making of the cloth. This change in the economy of the linen trade was certainly a great benefit, as it insured the application of a large amount of skill and capital where both were previously rather deficient, and this contributed to promote that evenness of make and regularity of production so much to be desired in all manufactures.

Having now given an outline of the History of the Flax Plant in Ireland, I shall proceed, in my next letter, to consider its chemical composition and the soils best adapted for its growth; some description of the most approved systems of treatment while in the hands of the farmer will naturally follow—and thence to trace the fibre through the many interesting processes of manufacture till, after the employment of so much labour, it eventually reaches the hands of the consumer.

MECHANICS' INSTITUTES.

PRACTICE AND THEORY.

Sir,—Having been a Member of the Society of Arts for some time, it gives me great pleasure to observe the increasing value of the lectures delivered before the Society, and so promptly reported in the Journal. This promptitude in publishing the lectures and the discussions upon them is a matter of considerable importance, and when contrasted with the remissness in this respect of many other Societies and Institutions, reflects great credit upon the Council and officers of the Society of Arts.

These lectures might be read and re-discussed in many if not in all the Institutions in Union with very great advantage to the members of these societies, and would tend to make the union more intimate and more reciprocally beneficial.

There appears also a true spirit of philanthropy breathing through the numerous communications which from time to time appear in the Society's Journal; and any one who reflects upon the great amount of vice and poverty, principally the result of ignorance and misapplied resources, must hail with pleasure the increasing interest taken by the informed and the wealthy classes of society to benefit the lower classes, both mentally and physically.

The attentive observer must perceive that the present is no ordinary era in the world's history. There is an unusual upheaving of the substratum of society; an immense mass of knowledge, both of good and evil, is being acquired by all classes of the community, and it is incumbent upon all right-minded persons to endeavour to increase the amount of useful knowledge, as the most efficient mode of abating that of an immoral and debasing tendency.

It has long been a matter of regret that Mechanics' Institutes have to a great extent failed to realise the hopes of their original promoters, and it has consequently been found necessary in numerous cases to reconstruct them so as to embrace a wider range and a higher standard of literary attainment, with the view of adapting them to the class next above the mechanic in the scale of information.

Doubtless many causes may have operated to produce these effects. The great mass of mechanics did not possess sufficient preliminary education to enable them to appreciate the advantages of a good library, or to derive much advantage from attending scientific lectures, and few among themselves could take a lead in forming and instructing classes on practical subjects.

The funds becoming deranged, recourse was had to lectures upon more popular and attractive subjects than those originally intended for mechanics to replenish them, and consequently some Institutions became little more than mere singing establishments.

Much good, however, has been effected, and the Institutions, as they now stand, will form nuclei or rallying points, when preliminary instruction to a certain extent will become a matter of state policy, as it must ultimately do. In the meantime, the example of the Society of Arts, and the union effected with many societies throughout the country, with numerous other propitious events of the day, will continue to produce effects as beneficial as those contemplated by the original Mechanics' Institutes.

The seeds of truth, whether moral or scientific truth, are imperishable, and must at some time or other produce good results.

It cannot be too much deplored that many mechanics prefer the debasing orgies of the pot-house to the pleasures of mental cultivation to be obtained in connection with Mechanics' Institutions. It is necessary, therefore, that the kind of information presented to the mechanics, in the first instance at least, should be the most attractive, and as much as possible connected with his every-day pursuits. It should be practical, not speculative; palpable, not abstract.

Uneducated mechanics frequently profess, and, no doubt, entertain great contempt for theoretical knowledge,

and many of our theoretical writers of the present day unfortunately consider this morbid attachment to the empirical rules derived from mere practice as a proof that mechanics cannot be raised above the practical application of the scale and compasses. It is quite clear, however, they must begin there and be drawn gradually into the theoretical principles upon which correct and successful practice are based. Theory and practice ought to go hand in hand,—whilst theory corrects the blunders of practice, practice ought to check the assumptions of theory.

If the mere practical man of the present day look with pity, if not contempt, upon the pure theorist, it is only necessary to look back in the history of the arts and sciences to discover that theorists have treated practical subjects, even the application of useful inventions, with derision and scorn.

It may be considered a curious phenomenon in the history of man, that, notwithstanding his numerous wants and the necessity which existed for supplying those wants by mechanical contrivances, and by rendering the powers of nature subservient to his use, philosophical research absorbed the attention of the learned, whilst art was despised and neglected; nor does it appear that the mechanical arts flourished until philosophy condescended to moderate her lofty pretensions and assume her proper position by becoming the handmaid and the patroness of the arts.

The aversion of philosophy to art was carried to its greatest height under the sway of the lofty intellects of Socrates, Plato, and Seneca. Geometry was considered by these mistaken theorists as a mere discipline of the mind, a purely intellectual exercise and amusement, and that to apply its principles to any of the useful practical purposes of life, was to degrade it into a low and despicable craft.

A distinguished writer ventured to place the discovery of the principle of the arch, and the introduction of the use of metals, as some of the many blessings which mankind owed to philosophy. Seneca regarded this as an insult, and indignantly replied that philosophy had nothing to do with teaching men to rear arched roofs over their heads; the true philosopher does not care whether he has an arched roof or any other roof.

Philosophers have now, fortunately, become more practical, and do not disdain the comforts and conveniences of life any more than the vulgar masses of mankind; they even go so far as to prefer an elegant, commodious house to the more philosophical habit of living in a tub.

The aim of true philosophy is to teach man how to subjugate matter to the intelligence of mind; to make the powers and properties found in nature do his bidding, and labour in his service; and also to subject his own powers to that Being from whom they are derived, and by whose assistance he is enabled to apply them to their legitimate uses.

Bacon has the credit of having first turned men's minds from dreamy speculations to practical subjects; to interrogate nature directly in order to develope her powers; to control these powers, and press them into the service of man; to bring various substances into immediate contact, in order to ascertain the effects which such contact would produce.

The Royal Society, which was originally founded upon the philosophy of Bacon, gave a great impulse to practical science. The early proceedings of the Society, however, do not prove that its members were altogether emancipated from the trammels of the astrologer and the alchemist of a previous age. The Society was chiefly composed of the great, for the time had not arrived when the great and the noble could unite with the horny-handed sons of industry in the pursuit of investigations which would add to the pleasures of the one class, or diminish the labour of the other.

It may also be doubted whether the developments of practical science do not proceed more naturally and more rapidly when they ascend than when they descend; hence the great impulse given by Watt and his immediate associates in the practical inventions of the last century. The man pressed by numerous wants is likely to turn his mind towards objects with which to supply those wants, whilst those whose necessities are already supplied will seek for amusement—the one will, therefore, aim at the production of a steam-engine; the other will be satisfied with a philosophical toy.

The Society of Arts can claim the honour of combining the efforts of the gifted philosopher with those of the humble mechanic, of bringing together the scientific investigator and the skilful artisan. Hence arose the era of the steam-engine—an invention in which it is difficult to say whether it is most indebted to philosophical research, to mechanical manipulation, to the pure science of the theorist, or to the ingenious contrivances and accurate workmanship of the operative.

Theory and practice are now tolerably well reconciled, mutually assisting each other; and hence the gigantic improvements of the last half century.

As the *Journal of the Society of Arts* is forwarded to all the Institutions in Union, it would, it is presumed, be of advantage to many of the Institutions if several subjects were treated practically in consecutive chapters as text books for classes—such, for example, as Practical Geometry, Arithmetic, Mensuration, Algebra, Mechanics, Chemistry, &c., &c., showing, by familiar examples, the intimate connection of these subjects with the practical pursuits of every-day life. These subjects ought to be treated with the greatest simplicity, in order to supersede the necessity of a teacher, and to enable any member of the class to act in the capacity of teacher or monitor, whilst he is being instructed himself equally with the other members of the class.

The Society for the Promotion of Useful Knowledge produced many valuable treatises, but by no means adapted to the wants of the classes for which they were ostensibly intended. It is much better to err on the side of simplicity than on that of abstruseness. Members of Mechanics' Institutes, who possess sufficient preliminary information to understand any of the numerous existing works on scientific subjects, will avail themselves of the advantages to be derived from a careful study of these works; but those members who have no such preliminary knowledge ought not to be passed over without some effort being made in their favour, and more particularly by the Society of Arts.

If the suggestions which I have made be adopted, there will, no doubt, be a sufficiency of talent to meet the case.

I am, Sir, yours truly,

ALEXANDER DOULL.

1, Morden-terrace, Greenwich,
May 2, 1854.

PUBLIC LENDING LIBRARIES.

Letter II.

Sir,—The enunciation and establishment of a principle is not always the most difficult part of a question. We live in a practical age, and we must not only prove a proposition, but show how it can be carried out. Unless our scheme comprehended this, after setting out on principle, and taking high ground, we are often obliged to descend to expediency, and show in what manner, by certain compromises, our principles may be established. It is useless to tell us what ought to be done, unless we are prepared to show how it may be done. Now, to apply this to the proposition before proved respecting education and libraries, it is necessary that we should call in aid not one but many co-operative means to effect our purpose. We have to contend with indifference, ignorance, and illiberality; the first in those whom some absorbing interest of their own monopolises; the second in those whose minds and views are narrowed within the sphere to which they have been themselves accustomed, and within which

they have been brought up, and who cannot estimate or appreciate the value of any mutual resource; and, thirdly, in those, niggardly in themselves, and narrow-minded towards others, who grudge every call that is made on them, and dispute, on principle, of course, every effort that is made to raise the classes whose degradation they admit, and whose faults and follies they are never slow to insist on. The co-operative principle, if it may be so called, has been found in practice the most effectual means of neutralising these evil tendencies. By giving aid on conditions, it is wonderful how actively the benevolence of our modern world is called into operation. The Church Building Societies, the Educational Societies, and the Committee of Council on Education itself, have largely availed themselves of this co-operative agent; until we have learnt, under teaching of such general application, hardly to look for a gift, and still less to value it when given. In our schools, we have practically found that it is not the cheapest, but those in which a good price is paid for a good education, that are most successful. People are prepared to exert themselves, and to pay for that which is worth their money. The chief element of failure is worthlessness. If we attempt to palm off that which is bad, and insufficient for its purpose, by highly-colouring it, or in any way misrepresenting it, we shall signally fail, and materially injure that which we profess a wish to promote. If we consider the past—or I fear we must say present—state of many of our towns and villages, what reason have we to blame the labourer or mechanic for making the public-house or beer-shop his evening resort. It is but to him that which the club is to the higher classes, and with a better excuse. His home is too often comfortless; library, or source of mutual improvement or recreation he has none; his only chance of hearing the news, seeing a paper, or having a gossip, is in the public-house; and what is commenced in a desire to pass a listless hour, or even to find mental recreation, ends, as the phrase runs, "for the good of the house," in habits of drunkenness. In such a state, his three friends—indifference, ignorance, and illiberality would leave him. Let it be our effort to see if we cannot rouse him from his hopeless state; and in offering him the advantages of his age without its correspondent evils, endeavour to wean him from the dangerous part of his position, and to improve that which is good. Such is the desire of mental culture among the better portion of the humbler classes, that the value of a library of useful, sound, and practical books would be readily acknowledged, and sacrifices would be made to secure such a benefit. A proof of this, for a kindred object, is given us in the readiness with which many of the poorest will cheerfully increase their payments to secure the advantages of a better school for their children. They will pay for that which is in itself valuable, and likely to improve the condition of their children in the world. There is no backwardness on their part, as may be readily proved by numerous instances in which good schools have answered, and become, to a certain extent, self-supporting; but they will not pay, and they will not exert themselves, and they are right, and too clear sighted to be imposed upon, for that which has the mere cold sense of duty to impel them to it, and of which they can see no fruit, either spiritual or temporal. Let us, then, apply our experience thus gained to the next step in the educational scheme. If they will pay cheerfully for a good school, why not for a library to carry on their education. We had in the first case to deal with ignorant parents. We are now, to a certain extent, on vantage ground, and have to deal with those who are prepared to value the effort made for them, who have made some progress and are desirous of further improvement. They are young persons, earning good wages, and without the charges or expenses of a family. They have the means of subscribing. They have every inducement to make the effort as well for their own further advancement as for the resources and recreation it will afford them. If taken up in a liberal and conciliatory spirit, throwing aside prejudices, and offering them the advantages of their day, they would not be found backward to avail themselves of them, and the library, and the reading room if it may be joined to it, will become to them in one respect at least, and that free from objection, what the public house has hitherto been, and without any very great fault on their part, namely the place of evening meeting after their work is done, the *reunion* and centre of an agreeable and improving social intercourse, which will bring classes together with great mutual benefit, and promote that good feeling which should be anxiously fostered between members of every community. We know well how many dissensions and differences there are in the world, how many there are in religious belief, but here in general literature and science where there may be differences, there are no heartburnings nor jealousies, and it is delightful to find such a bright spot on which to build some rational hope of peace and spiritual improvement. As a practical question, the library is a great benefit to all. The farmer has generally but a very small shelf of books to go to, the labourer none, and thus both would willingly join, and in their due share and proportion, in aiding that which should be a benefit to all. If the reading room be added to the library, the farmer finds his convenience in seeing the paper of the day at a cheap and easy rate, and thus classes are brought together the tendency of whose positions and employments has been to separate. In all cases where such an effort has been made it has succeeded beyond expectation. The ground-work of our operations, therefore, in endeavouring to establish libraries, should be to encourage and foster the development of such institutions in the different localities, calling local interest and influences into active operation. I proceed to endeavour to point out how this may be done. The agency I would propose would be a local district or county association, offering to stimulate local efforts by grants in aid, and otherwise to assist the projectors. Through such an agency the subject may very advantageously be brought under the consideration of the parties interested; facilities may be afforded them of comparing what has already been done, and in localities in all respects like their own, and assistance offered them in those matters of routine, which are often serious obstacles to a successful movement, where the idea of such an institution has never been entertained. Lectures on interesting and popular subjects have proved most useful pioneers, and a band of lecturers, offering their gratutious services, have often broken up the ground and led to the taking up and carrying out with spirit, institutions of a permanent and useful character. There are prejudices respecting lectures; let us admit that they have been abused; that trusting to these as a sole means of education would be dangerous and very deceptive; that classes for more solid and practical instruction, is what is to be desired. Let all this be admitted, and it is admitted readily by every one who seriously thinks of it. Still we must walk before we can run; and he knows little of the general state of the country who thinks that he can in the first instance introduce classes into one tenth part of the town or village populations, without in some pleasurable manner leading them to take an interest in the acquisition of that for which they have no taste nor desire. Lectures are the means of opening their eyes and understandings to these things, and if delivered by local lecturers they will be much more likely to be adapted to the taste, the wants, and the condition of the hearers, who by such preparatory means will be raised to the state in which a higher effort for their improvement may be most advantageously made. In this manner we shall have made two steps in a right direction. We shall have elicited a local effort, and we shall have backed up and fostered that effort by such assistance as a grant in aid affords. There remains only for the Society of Arts to extend its fostering aid to this, by including such institutions within the range of its

book purchases, and thus assisting them to form their libraries on the easiest terms. We have, then, a machinery complete by which these very desirable objects may be obtained, by which the education of the country, only commenced in the school may be carried on, and that improvement secured which the amenities of literature and the truths of science work out wherever they are duly cultivated. These are not merely proposals, nor theories, but have been practically worked out in instances which may be referred to; and although the effort is of too recent a date to speak with a becoming confidence of results, we may at least satisfy ourselves that if the principles advocated be sound, they have so far at least borne the fruits that might have been expected from them. In the autumn of 1853, the Hants and Wilts Educational Society was founded. It proposes as its objects to furnish a staff of lecturers, to contribute to the establishment of Libraries and Reading-rooms, and to organise a system of lectures during the winter months in the smaller village institutions, on the principal of the projectors mutually assisting one another. In furtherance of the objects, it has endeavoured to remove the first obstacle in the way of the lecturer, and diminish the burden of those undertaking to assist, by establishing a depôt of diagrams, models, &c. Moving on this basis, the society addressed itself to the friends of education, and to those most likely to take an interest in its proceedings; and it has been answered by the reception into Union, in the six months passed since the commencement of its operations, of more than thirty-five town and village institutions, seven only of which previously existed, and only five of which were in union with the Society of Arts, thus showing the extended area which the operations of the Society have embraced. In many of these institutions libraries have been formed and reading-rooms opened, for which a succession of lectures was found a useful means of preparing, thus giving that stimulus to local interest and exertions which in the commencement of such an enterprise is often required. It has been already said that it will not yet do to point to results. The movement is too recent, and the whole working of the society too little developed to admit of any boasting or even feeling any undue confidence in the progress that has been made. The society has received the distinguished patronage of H.R.H. the Prince Albert, President of the Society of Arts, ever ready to extend his aid and offer his countenance to an effort such as this is to raise and improve the social status of the humbler classes; and it is earnestly hoped that his confidence will not be misplaced, but that much practical good will be gradually worked out among classes whose mutual improvement has hitherto been too much neglected. Remarkable cases of success in villages of an entirely agricultural population, might be quoted, in which libraries and reading rooms have been established, and school rooms enlarged or rooms independently taken for their accommodation; such cases may cheer us for our efforts but for such purpose only would I refer to them. We are only putting on our armour; but if the measures I have pointed out can be satisfactorily harmonised; if unity of design can be established between local effort and the assistance offered by a district board, I have no fear or misgiving whatever that even a greater result may be the product than the most sanguine have anticipated. Willingly would I see the same effort made in other districts, and we should then gradually acquire that knowledge of the best mode of operation which is so essential to success. S. B.

Proceedings of Institutions.

Brighton.—The third annual Report of the Mechanics' Institution, states that the present number of members is 390, being an increase of 70 during the past year. The Library now contains 2455 valuable works, the increase during the year being 679 volumes, 316 by purchase, and 363 by donations. The circulation of books also continues on the increase, the reading-room has been much resorted to, and the lectures have been well attended. The fêtes and *soirées* of the past year were equally successful with their predecessors. The classes are, however, not so well appreciated as they might be, but the Committee trust that the inducements held out by the Palestine class, which originated in a suggestion made by Mr. Harry Chester, and to which that gentleman offered prizes of 60s. 30s. and 20s. and by the classes about to be formed under the direction of Mr. H. Stein Turrell, a vice-president, will work a beneficial change in this respect. The Town Commissioners have refused to appropriate a portion of the *unoccupied* premises at the Pavilion to the uses of the Institution. The report also refers to the labours of a Committee, organized for the purpose of raising a testimonial fund to the memory of the late Rev. F. W. Robertson, a vice-president. It is intended to place a medallion on his tomb, the subject of which will be the "Scholar teaching the Artizan," designed by Mr. E. W. Wyon. The Treasurer's report shows that the receipts amounted to £252 16s. 6½d., and the expenditure £216 11s. 10d., leaving a balance in hand of £36 4s. 8½d.

Hastings.—The twenty-first anniversary of the Mechanics' Institution was celebrated on Wednesday week, when two meetings were held at the George-street Assembly Room. At the morning meeting A. H. Layard, Esq., M.P., gave an account of his discoveries at Nineveh, illustrating his remarks by reference to an excellent series of diagrams, printed on linen. At the evening meeting the Report of the Committee was read by Mr. J. Banks, the secretary. It stated that the origin of the institution was due to three young men—a chemist and druggist's apprentice, a journeyman tinman, and an ironmonger's assistant—who, with a desire to improve their minds, joined a Book Society which existed prior to the year 1833. The periodical exchange of books was effected at a public-house, and this they endeavoured to alter, but without effect. At last they sat about obtaining the loan of a school room, got up a public meeting, and, on the 23rd April, 1833, the laws of the institution were sanctioned by the members, then reaching nearly 100. It has now a well-selected library of 1,500 volumes; its reading-room is well supplied with papers and periodicals; and the members number 244. In the winter season, lectures on useful subjects are generally delivered weekly. This winter there had been upwards of twenty lectures. This department is supplied, almost exclusively, by gratuitous lecturers, chiefly from members of the institution, yet it need not be ashamed at the results it has been instrumental in producing in the lecture department. The institution possesses classes for writing, English grammar, and discussion. The teachers' services are all gratuitous. Speeches were subsequently delivered by Mr. P. F. Robertson, M.P., Messrs. Burton and North, Rev. T. Vores, A. H. Layard, M.P., and others. On the motion of Mr. J. Banks, seconded by Mr. J. Rock, jun., Mr. Layard was elected a life member of the institution.

London.—On Monday evening April 23rd, Mr. H. R. Montgomery, delivered a lecture at the Pimlico Literary, Scientific, and Mechanics' Institution on "The Life and Writings of the Poet Moore." After the lecture the Chairman announced that a very handsome donation of books had been received for the library of the Institution from their respected treasurer, Mr. J. J. Fortescue, consisting of "Buffon's Natural History, 18vols." "Smollett's History of England," 15 vols.; Shakspeare's Works, "History of Scotland;" "Goldsmith's Roman History;" "Lord Chesterfield's Letters, &c., &c., in all 129 vols. The chairman stated that it was with regret that he had to mention that the above was intended as a parting memento from their treasurer on his removing from London. Several very interesting additions have also been made to the library by the members and friends of the Institution during the present year.

To Correspondents.

Erratum in No. 75, p. 408, col. 2.—The proceedings of the Clapham Literary and Scientific Institution are reported under the head of Camberwell. The latter should have stopped at line 27, *great humour and cleverness.* From *on the 21st inst*, &c., refers to the Clapham Institution.

MEETINGS FOR THE ENSUING WEEK.

Mon. Inst. British Architects, 8.—Resumed Discussion on the Drainage of Buildings and Streets in the Metropolis.
Chemical, 8.
Statistical, 8.—1. Mr. William Tayler, "A Statistical and Historical View of the Statutes of the Realm." 2. Mr. F. J. Minasi, "On a Decimal System of Coinage."

Tues. Pharmaceutical, 11.—Anniversary.
Royal Inst., 3.—Professor Tyndall, "On Flame."
Pathological, 7.
Civil Engineers, 8.—Mr. F. Braithwaite, "On the Fatigue and Consequent Fracture of Metals."

Wed. Literary Fund, 3.
Royal Botanic, 3½.—Promenade.
Society of Arts, 8.—Mr. Waterhouse Hawkins, "On Visual Education as applied to Geology."
Microscopical, 8.

Thurs. Royal Inst., 3.—Mr. M. T. Masters, "On Botany."
Antiquaries, 8.
Royal, 8½.

Fri. Architectural Assoc., 8.
Royal Inst., 8½.—Prof. Tyndall, "On Some Phenomena Connected with the Motion of Fluids.

Sat. Asiatic, 2.—Anniversary.
Royal Inst., 3.—Dr. C. G. B. Daubeny, "On the Importance of the Study of Chemistry as a Branch of Education for all Classes."
Royal Botanic, 3½.
Medical, 8.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 12th, 15th, 20th, 21st, 27th, April, 1854.

Par. Numb.
120. Courts of Equity—Returns.
124. Public Debt—Account.
147. Mail Packets—Return.
153. Militia—Return.
158. Railway Schemes—Return.
168. Railway Acts—Return.
171. Arctic Expedition—Copies of Instructions.
174. National Debt—Account.
98. Railways—Return.
126. Increase and Diminution (Public Offices)—Abstract of Accounts.
148. Loan Societies—Abstract of Accounts.
150. Court of Chancery—Return.
160. Spirits—Account.
176. British Museum—Account and Estimate.
44. Local Acts—Reports from the Admiralty.
141. Steam Vessels—Return.
145. Medical Practitioners—Return.
151. Irish Reproductive Loan Fund—Account.
167. Captain Noble—Copy of Report.
175. Distillers, &c.—Returns.
179. Army—Return.
182. Hops—Account.
183. Workhouses (Ireland)—Return.
184. Incumbered Estates Court (Ireland)—Return, &c.
185. Quit and Crown Rents (Ireland)—Return.
60. Bills—Burgh Boundaries (Scotland).
61. Bills—Criminal Conversation.
65. Bills—Real Estate Charges.
63. Bills—Drainage of Lands.
67. Bills—Holyhead Harbours.
73. Bills—Canterbury Bribery Prevention.
74. Bills—Cambridge Bribery Prevention.
75. Bills—Kingston upon Hull Pribery Prevention.
76. Bills—Maldon Bribery Prevention.
77. Bills—Barnstable Bribery Prevention.
79. Bills—Witnesses.
69. Bills—Valuation of Lands (Scotland) (amended).
72. Bills—Oxford University (amended).
70. Bills—Hustings Expenses.
66. Bills—Registrations of Births, &c. (Scotland).
78. Bills—Wreck and Salvage.
Oxford and Cambridge Universities (Corpus Christi and Emanuel Colleges, Cambridge;—Correspondence, Part 5, Supplement to Part 2.
Oxford and Cambridge Universities (Christ Church, Oxford);—Correspondence, Part 6, Supplement to Part 1.
Prisons (Scotland);—19th Report of the Inspectors, Part 4.

Session 1852-3.
10 (1.) Drainages of Lands (Ireland);—Index to Lords' Report.
705 (1.) Devon and Dorset Railway:—Index to Evidence.

Delivered on 28th April, 1854.
138. Criminals (Ireland)—Abstract of Returns.
181. Ale and Porter—Return.
187. Irish Office—Return.
189. Public Income and Expenditure (Balance Sheet)—Account.
169. Accidents in Coal Mines—1st Report from the Committee.
163. Emigrant Ships—1st Report from the Committee.
Eastern Papers (Protocol signed at Vienna)—Part 8.

Delivered on 2nd May, 1854.
165. Civil Service (Ordnance Department)—Copies of Warrant and Regulations.
Turnpike Trusts—Fourth Report by the Secretary of State, with Abstract of Accounts.

Delivered on 3rd May, 1854.
193. Infanticide—Return.
195. British Spirits—Account.
200. Arctic Expedition—Copy of Instructions.
166. Athlone and Galway Railway—Return.
82. Bills—Railway and Canal Traffic Regulation (Amended).
83. Bills—Militia.
Russia—Copy of Declarations, Proclamations, &c.
Agricultural Statistics (England)—Reports.
Medical Charities (Ireland)—Second Report of Commissioners.

Delivered on 4th May, 1854.
178. Emigrant Vessels—Copies of Reports.
198. Suspended Canoaries, &c.—Return.
156. Ordnance—Supplementary Estimate.
203. Navy—Supplementary Estimate.
204. Army—Supplementary Estimate.
81. Bill—Testamentary Jurisdiction.

Delivered on 5th May, 1854.
59. Bill—Criminal Procedure.
Census of Great Britain, 1851, (Religious Worship and Education, Scotland)—Report and Tables.
Emigration (North American Colonies)—Papers.
Census of Ireland, 1851. Part 3. Report on the Status of Disease.

Delivered on 6th and 8th May, 1854.
57. (3.) Trade and Navigation—Accounts.
190. River Thames—Copy of Report.
201. Slave Trade—Return.
214. Deficiency Bills, &c.—Return.
194. Income Tax (Ireland)—Returns.
199. Burial Grounds—Return.
206. Poor Law Unions (Ireland)—Return.
215. Committee of Selection—10th Report.
216. Railway and Canal Bills—5th Report from Committee.
71. Bills—Stannaries Court (No. 2).
85. Bills—Public Statues.
87. Bills—Railway and Canal Traffic Regulation (as amended in Committee and on re-commitment).
45 (a). Judgments Execution—Amendments to be proposed by Mr. Craufurd.
45 (b). Judgments Execution—Amendments to be proposed by Mr. Whiteside.
Census of Great Britain, 1851, (Education, England and Wales)—Report and Tables.
Queen's College, Cork—Report of the President.
Loan Fund Board of Ireland—Sixteenth Report.

Delivered on 9th May, 1854.
221. Ships "Sampson" and "Cacique"—Copy of Report.
84. Bill—Industrial and Provident Societies.

Delivered on 10th May, 1854.
44. Local Acts (No. 49, Londonderry Bridge Bill; No. 50, Londonderry and Enniskillen Railway Bill)—Reports from the Admiralty.
186. Grand Jury Cess, &c., (Ireland)—Return.
205. Drainage (Ireland)—Return.
209. Poor Relief (Ireland)—Return.
218. Excise Offices—Return.
219. Public Buildings (Downing street)—Return.
222. Railway and Canal Bills—Sixth Report from Committee.
88. Bills—Witnesses (amended).
90. Bills—Chimney Sweepers.
91. Bills—Manning the Navy.
92. Bills—Navy Pay, &c.
Public Health Act—Report from the General Board of Health.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 5th*, 1854.]

Dated 4th March, 1854.
527. C. De Bergue, 9, Dowgate hill—Apparatus for bearing and buffing purposes.

Dated 8th March, 1854.
549. J. C. Edington, 23, Leicester square—Propelling vessels and firing guns.

Dated 29th March, 1854.
722. C. Barlow, 89, Chancery lane—Permanent way.

Dated 1st April, 1854.
751. W. Johnson, 47, Lincoln's inn fields—Reduction of metallic ores and salts. (A communication.)

Dated 6th April, 1854.

803. W. Richards, Barcelona—Wet gas meters.

Dated 7th April, 1854.

807. F. R. A. Glover, M.A., Bury street—Two-wheeled carriages.

Dated 18th April, 1854.

888. S. J. Healey, Over Darwen—Steam boilers.
890. J. Bernard, Club chambers, Regent street—Boots and shoes.
894. H. H. Gibbs, 15, Bishopsgate street—Nitrate of soda. (A communication.)
896. W. Denton, Addingham—Combing wool.

Dated 19th April, 1854.

898. J. D. Pfeiffer, Paris—Bookbinding.
899. M. Poole, Avenue road, Regent's park—Drying and weighing fibrous substances (A communication.)
900. J. Kirkham, Tonbridge place—Consuming smoke.
901. J. C. Haddan, Chelsea—Adhesive stamps and labels.
902. J. Jeyes, Northampton—Pulp for paper making.
903. J. Briggs, Derby—Communicating from one part of a train to another.
904.—H. Clarke, Lincoln—Cannons, guns, and fire-arms.

Dated 20th April, 1854.

906. F. Vickers, Manchester—Manure.
907. E. Hunt, 40, Walcot square, Kennington road—Extracting metals from minerals.
908. R. Richardson, 26, Great George street, Westminster—Joining pipes.
909. J. Pym, Bangor—Pipes.
910. H. Brown, Halifax—Combing fibrous materials.
911. J. M. Reed, 19, Northumberland street, Strand—Amalgams.
912. G. Jones, Iron works, Sedgley—Landing apparatus for mines.
913. W. Johnson, 47, Lincoln's inn fields—Bricks or tiles. (A communication.)
914 W. Johnson, 47, Lincoln's inn fields—Apparatus for discovering the leakage or escape of gas. (A communication.)

Dated 21st April, 1854.

9 5. T. Wood and S. H. Heginbottom, Culcheth—Metallic pistons.
916. F. B. Anderson, Gravesend—Spectacles.
917. R. J. and F. W. Crickmer, Bermondsey—Cannon.
918. C. Cammell, Sheffield—Permanent way.
919. R. H. Collyer, Norfolk street, Strand—Crushing machinery.
920. W. and J. Harcourt, Birmingham—Candlesticks.
921. S. Minshull and C. Austin, Birmingham—Securing lids of packing cases.
922. W. B. Stephens, Mark lane—Lamps. (A communication.)

Dated 22nd April, 1854.

924. H. B. Barlow, Manchester—Metal nuts. (A communication.)
925. P. J. F. Mouchell, Paris—Treating ores.
926. J. Harlow, Moseley, Worcester—Paper, &c.
927. T. F. Finch, Worcester—Buttons.
928. J. Gill, Marsala—Distillation of spirituous liquors.
929. R. Galloway, Lambeth—Furnaces.
930. W. Goodchap, Walbrook—Power by carbonic acid gas. (A communication.)
931. J. Warren, 75, Old Broad street—Railways.

Dated 24th April, 1854.

932. C. E. Blank, Trump street—Reeling yarn into hanks.
934. C. Hart, Iron works, Wantage—Thrashing machines.
936. J. Wilson, Croydon—Portable houses.
938. J. Combe, Belfast—Hackling machinery.

Dated 25th April, 1854.

944. F. L. H. Danchell, Acton—Motive power.

WEEKLY LIST OF PATENTS SEALED.

Sealed May 5th, 1854.

2569. John Smith, Albion works, Bradford—Improvements in millstones for grinding corn, seeds, or minerals.
2572. John Hyde, of Sheffield—Improvements in furniture castors.
2574. Robert William Jearrad, of 17, Upper Eccleston place, Eccleston square—Improvements in steam boiler and other furnaces.
2577. William Beckett Johnson, of Manchester—Improvements in steam engines, and in apparatus for indicating the pressure of steam.
2583. Jonathan Grindred, and Alexander Hunter—Improvements in steam engines.
2584. Henry Wiglesworth, B.M., of Newbury—Improvements in connecting together or coupling railway carriages.
2585. Robert Roughton, of Woolwich—Improvement in steam boilers, which is applicable to other vessels for containing compressed air, vapour, or gas.
2586. Thomas Walker, of Birmingham—Improvements in signal apparatus for the prevention of accidents on railways.
2594. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in machinery for combing and preparing wool and other fibrous materials. (A communication.)
2676. Thomas Holmes, of Pendleton—Improvements in ventilating drying stoves.
2689. Auguste Castets, of Paris—Improved composition for curing diseases in the feet of animals.
2754. Emmanuel Barthélemy and Tony Petitjean, of Upper John street, Fitzroy square, and Jean Pierre Bourquin, of Newman street, Oxford street—Improved means of ornamenting glass.
2768. Prix Charles Jean Baptiste Sochet, of Paris—Improvements in obtaining motive power by means of heated gases.
2802. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in blocks for ships and other uses.
2910. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvement in "blasting powder" for mining and other operations of a similar nature.
2942. John Greenwood, of 10, Arthur street west, London bridge—Improvements in preventing drafts of air into rooms and places when the doors and windows are shut.
3010. Francis Parker, of Northampton—Improvement in the manufacture of gaiters.
232. Edward William Kemble Turner, of 21, Praed street—Treating gold and other ores.
317. Farnham Maxwell Lyte, of Florian, Torquay—Improvements in apparatus for ascertaining the depth of water.
375. John Davie Morries Stirling, of the Larches, near Birmingham—Improvements in the manufacture of steel.
402. James Beall, of Effingham place, Cheshunt—Improvements in apparatus for suspending looking glasses in frames.
430. James de Wolfe Spurr, of 16, Kenyon terrace, Birkenhead—Improvements in distilling coals, and bituminous and resinous substances, and products thereof.
472. John Davie Morries Stirling, of the Larches, near Birmingham—Improvements in the manufacture of tubes and cylinders of steel.
487. James Medwin, of the Blackfriars road—Improvement in water guages for steam boilers.
506. Thomas Metcalfe, of 19, High street, Camden town—Improvements in the manufacture of portable and folding bedsteads, chairs, seats, tables, and cots.
522. Caleb Bloomer, of West Bromwich—Improvements in spikes and bolts.
544. William Clay, of Liverpool—Improved mode of manufacturing axles, shafting, and other like solid articles which present a round figure in cross section.
548. Henry Bernoulli Barlow, of Manchester—Improvements in waterproofing and finishing textile fabrics and yarns.

Sealed May 9th, 1854.

2598. Jérome André Drieu, of Patricroft—Improvements in machinery for cutting velveteens and certain other fabrics to produce a piled surface.
2610. Edward Gregson Banner, of Cranham hall, Essex—Improvements in saddlery and harness.
2614. William Steel, of Glasgow—Improvements in machinery or apparatus for mashing malt.
2619. James Hill Dickson, of Evelyn street, Lower road, Deptford—Improvements in the process of preparing flax, or similar fibrous material, and rendering it fit for spinning and weaving.
2623. François Amand Délande, of Paris—New metallic composition.
2655. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in thrashing machines, and in apparatus connected therewith. (A communication.)
2663. George Dugmore, and George Haywood Millward, both of Birmingham—New or improved method of signalling or communicating between trains on railways.
2698. Walter Henry Tucker and William Rashleigh Reeves, both of Tiverton—Improvements in locks.
2767. John Walmsley, of Accrington, and John Ingham, of Blackburn—Improvements in looms.
2955. James Hunter Campbell, of No. 1, King's Arms yard, Coleman street—Improvement in machinery for cutting corks.
303. Alfred Vincent Newton, of 66, Chancery lane—Improvements in bleaching textile fabrics. (A communication.)
357. Thomas Irving, of Mould green, near Huddersfield—Improvements in obtaining a metallic and lustry appearance to fabrics and yarns.
595. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in lighting. (A communication.)
621. John Houston, junior, of Glasgow—Improvements in working steam boilers, and in apparatus connected therewith.
634. James Garth Marshall, and Peter Fairbairn, both of Leeds—Improvements in machinery for combing flax, tow, wool, hair, and other vegetable or animal fibres.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
1854. May 10.	3591	Spring Fastener for Porte Monnaies, Cigar Cases, &c.	Christian Weintraud, junr.	Offenbach, O.M., Grand Duchy of Hesse, and 4 King William Street, Cheapside, London.

Journal of the Society of Arts.

FRIDAY, MAY 19, 1854.

EDUCATIONAL EXHIBITION.

Friends of educational progress about to travel abroad, who may be willing to assist the Council of the Society of Arts, in obtaining foreign contributions for the proposed Educational Exhibition, are requested to communicate with the Secretary, who will point out, in reference to each country, the objects and documents particularly desired.

Members of the Society of Arts, and of the Exhibition Committee, are invited to facilitate the operations of the Sub-committee for Correspondence, by communicating to the Secretary, the names and addresses of persons of the following description residing in foreign countries or in the British Colonies:

1st. Trustworthy persons residing at important seaports, or other places of easy commercial access, who would be suitable agents for receiving foreign donations of educational subjects, and for transmitting them to London.

2ndly. Persons taking an interest in educational matters, to whom the programme of the Exhibition should be sent, for spreading a due appreciation of its usefulness, and procuring co-operation.

3rdly. Persons connected with education through their official position, professional pursuits, commercial interests, or otherwise, who might be induced to become contributors of objects, drawings, or documents

As the approaching exhibition is intended not only to extend the knowledge of existing educational appliances but also to promote the production of educational desiderata, communications pointing out the deficiencies which it would be most desirable to supply, and, if possible, suggesting means for supplying them, will be readily inserted in the Society's Journal, with a view to direct the attention of authors and inventors.

On account of the shortness of the time before the opening of the exhibition, it is requisite that communications be sent in without delay.

The following copy of a despatch has been received from the Foreign office:

"Stockholm, May 2nd, 1854.

"My Lord,—In accordance with the instructions contained in your Lordship's despatch No. 14, I addressed a note to Baron Stierneld, on the 28th of February last, respecting the Educational Exhibition proposed to be held in London in the month of June next. I have received no reply from his Excellency, but I was visited yesterday by a M. Siljeström, one of the Directors of the new Elementary school in Stockholm, who informed me that he was appointed by government to attend the Exhibition in London, and he expressed to me the desire to be informed upon what day it was necessary he should be present in London.

"M. Siljeström's appointment is officially announced in the *Gazette* of this evening, and it is further stated that he is to take with him such models, books, maps, diagrams, &c., as may conduce to the object in view, and the sum of 666 rix dollars, (about 55*l*.) is granted by his Majesty, from the Educational Fund, for defraying the necessary expenses.

"I have &c.
"(Signed) W. G. GREY."

The Council of the Society of Arts solicits attention to the intended Educational Exhibition at St. Martin's Hall, in June next.

To give full development to this undertaking, to procure the co-operation, not only of the great Educational Societies and Institutions at home, but also in the Colonies and the Continental States, and to illustrate it by Lectures, with practical discussions, a considerable outlay must be incurred.

The Council deems it a duty to secure the funds of the Society from an expenditure which would interfere with its ordinary proceedings, and therefore invites the co-operation of the Members of the Society and of other friends of Education.

The following subscriptions have been already received:

	£.	s.	d.
H.R.H. Prince Albert, President	100	0	0
Amount of subscriptions published in last number	458	19	0

SECOND LIST.

	£.	s.	d.
J. G. Appold	5	0	0
J. Ames	5	0	0
W. Best	1	1	0
George Bell	1	0	0
Sir John P. Boileau, Bart	10	0	0
J. Caplin, M.D.	1	1	0
J. Coulthard	2	0	0
Joseph Curling	2	2	0
W. Duckworth	5	0	0
S. Freeman	3	3	0
Charles Hill	1	1	0
P. H. Howard	2	2	0
Captain L. L. Boscawen Ibbetson	3	3	0
Stephen Lewis, Jun.	2	2	0
G. Lowe, F.R.S.	2	2	0
J. J. Mechi	5	0	0
N. Montifiore	3	3	0
J. Morrison	1	1	0
C. de Murrieta	10	0	0
Rev. J. P. Norris	3	3	0
Rev. Arthur Rigg	2	2	0
Dr. Skey	1	1	0
T. Sopwith, F.R.S.	5	0	0
W. Spence, F.R.S.	10	0	0
The Lord Bishop of St. Davids	10	0	0
R. J. Spiers, Mayor of Oxford	1	0	0
William Tassie	2	2	0
Arthur Trevelyan	2	0	0
G. F. Wilson	10	0	0

TWENTY-SECOND ORDINARY MEETING.

WEDNESDAY, MAY 17, 1854.

The Twenty-second Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 17th instant, the Very Rev. the Dean of HEREFORD in the chair.

The following candidates were balloted for and duly elected Ordinary Members:—

Albrecht, John	Bonham-Carter, John, M.P.
Barlow, Rev. J., M.A., F.R.S.	Gregory, Isaac
	Spicer, William Revel

The following Institution has been taken into Union since the last announcement:—

358. Hull, Mechanics' Institution.

A model and drawings of a Smoke Consumer, for land or marine boilers, &c, were exhibited by Mr. Coupland. In this arrangement the fire was lighted in the usual way. When it became necessary to feed the fire, a series of false bars below the centre of the grate were raised to support the fire, while the fire-bars were lowered to

admit of the charge of fresh coal being placed on them. By this means the fresh coal was introduced under the incandescent fuel. All the air required to support combustion had to pass through the fire-bars from the ash-pit. On the walls were exhibited a collection of sixty Photographic Views, by Mr. P. H. De la Motte, of the Crystal Palace, showing the progress of the building itself; of the different Architectural Courts; of the Natural History Department; of the Ancient and Modern Sculpture, &c. These views had been most liberally presented to the Society by the Directors of the Company. Twenty-two Photographic Views in Gloucestershire, presented by Mr. Joseph Cundall, were also shown.

The Paper read was

ON VISUAL EDUCATION AS APPLIED TO GEOLOGY,

ILLUSTRATED BY DIAGRAMS AND MODELS OF THE GEOLOGICAL RESTORATIONS AT THE CRYSTAL PALACE.

BY B. WATERHOUSE HAWKINS, F.G.S., F.L.S.

It has been truly said, that the highest function of the Society of Arts must be its endeavour to promote the general advancement of education; and in the belief that such are the practical views of this Society, I presume, that its members cannot view with indifference any part of that great undertaking at the Crystal Palace, which may be so justly called a grand-child of the Society of Arts. It was here that the Great Exhibition of 1851 first saw the light, and, under the happy auspices of our Royal President, was brought to maturity—a giant born of peace and good-will to men; of such parentage how much is to be hoped for!

In this the 100th year of our existence as a Society, it is most happily conceived to lay before the whole world an exhibition of all the materials of education collected from all nations; therefore, in the hope that you will consider my attempt at least seasonable, I shall endeavour, very briefly, to lay before you this evening a slight sketch of part of one of those great efforts in an educational direction which the Crystal Palace Company are making for the benefit of their fellow-men of all classes; and no less is it a benefit to their fellow men because it is being done commercially, which, if properly analysed, will be found to be the most truly independent system and most congenial to the feeling of every right-minded Englishman.

The whole of the great scheme now working to completion, known as the Crystal Palace, might be properly described as one vast and combined experiment of visual education; and I think it would be easy to show that its educational powers and design constitute its legitimate claims to the support of all civilized Europe; but like its great parent, the Exhibition of 1851, it is too extensive to allow of even a short catalogue in the brief space of one hour; I therefore confine myself to a hasty sketch of part of the attempt to apply the active principle of teaching directly through the eye that branch of the truths of creation upon which I have been engaged for the last year and half.

This direct teaching through the eye has been recognised as a principle and a facility of education for some years past, even in the limited sphere of schools; and I believe the name of Pestalozzi deserves the most honourable mention in connection with its first enunciation as a recognised facility upon principle. His, and his followers', lessons on objects were urged upon the public some twenty years ago, and a writer who was quoted at the time, in support of the principle, shrewdly observed, that "we daily call a great many things by their names, without even inquiring into their nature and properties, so that in reality it is only their names, and not the things themselves, with which we are acquainted." If this remark was and is still applicable to our superficial knowledge of every-day objects, how much more literal it becomes when applied to that branch of science and truth (for science is only a synonyme for truth) which the Crystal Palace Company have so boldly undertaken to lay before the multitude; there we shall reverse that order of teaching which is described as the names and not the things with which we become acquainted; it will be the things with their names that we shall present to the people; and not only the people in the restricted sense of the word, but to the million, including the well-informed and those above the average in education and acquirements; to the majority of these the geological restorations will present all the novelty of a first acquaintance, for, with reference to the true form and size of the extinct animals, little more than the name was known to many who had an earnest desire to acquire some knowledge of geology, but whose scanty leisure would not allow of their pursuing their inquiries sufficiently far to realize that life-like interest which becomes almost essential for the successful continuance of any pursuit. Our natural sympathies are with life. That which does or has lived, will always be found to interest far beyond any inorganic object, however brilliant or beautiful.

Of course it is not my intention to offer you on the present occasion a lecture on Geology, or Palæontology, but only simply to describe in a few words the foundation upon which I have constructed and restored these great animals, and how I have obtained that truth and accuracy which may entitle my restorations of the extinct animals to be viewed as useful and trustworthy lessons to all classes, and which we hope will render the appearance and names of the ancient inhabitants of our globe as familiar as household words.

Geology and Palæontology, though deeply interesting to all who have had the opportunity for study, has hitherto been restricted to the professed anatomist, or to those whose great resources enabled them to make collections and to bring around them the costly requisites of their enthusiastically followed pursuits. Sir Philip Egerton, Lord Enniskillen, Sir Roderick Murchison, Mr. Bowerbank, and other distinguished names illustrate the limited number to whom the study of Geology and Palæontology was practically within reach. We have public museums it is true, but even our national collection at the British Museum, though containing some of the finest fossils that have been collected throughout the world, from their detached state, there being only two or three skeletons for comparison, offers little more than objects of wonder, literally only dry bones or oddly-shaped stones to the majority who see them. The inevitably fragmentary state of such specimens of course left much to the imagination, even to those who looked at them with some little knowledge of comparative anatomy, and as that amount of knowledge is not found among the average acquirements of the public at large, it was a fallow field, which nothing less than the great enterprise and resources of the Crystal Palace Company could have attempted for the first time to illustrate and realise—the revivifying of the ancient world—to call up from the abyss of time and from the depths of the earth, those vast forms and gigantic beasts which the Almighty Creator designed with fitness to inhabit and precede us in possession of this part of the earth called Great Britain.

Geology has been aptly called the science of nature's antiquities, for, however fresh, renewed, and vigorous in all her operations, yet even nature has had her olden time; her early days must have seen fierce struggles, contentious storms, fire and water, like the modern theories, struggling for the mastery; then her epoch of calmer subsidence and gentler rule, each state leaving its indestructable monuments, with their carvings and inscriptions, for man

to decypher. Nature's pyramids are mountains of granite, slate, and limestone; her aqueducts majestic rivers, leaving gigantic boulders for land-marks; but more to our immediate purpose, the geologist, like the morden antiquarian, finds his richest stores of information, in nature's cemeteries, where the bones of byegone generations lie embalmed with proof of how they lived and where they died.

The science of Palæontology (or, as the literal translation of the name indicates), the study of ancient beings, treats of the history of fossils; and its principal end is to make known the forms and the zoological relations of the beings which have inhabited the globe at divers epochs anterior to our own. It has also to fill one of the most remarkable pages in the history of the earth, by retracing the successive phases of the organization of the animals that have peopled it. It has two principal applications:—1st to Zoology, by making known those new or rather unknown forms and conditions of existence which are often wanting in living nature. It may, sometimes, by offering new transitions, demonstrate natural relations of which we were ignorant; it reacts also upon the general laws of comparative anatomy, and has contributed much to its researches and discoveries, and it is connected with all the questions relative to the origin and development of organised beings. 2ndly to Geology:—Palæontology again applies to geology, by furnishing the only certain basis for the determination of the stratified earths, and by clearing up several essential points relative to the ancient limits of Seas and Continents. The study of fossils is destined to throw a great light upon the determination of the order of succession of the beds or strata, and of their relative age. The study of fossils may also enlighten questions of detail. Certain sorts of fish and of mollusca are known to be essentially belonging to rivers, and others to inhabit the seas. If the fossils of an earth belong to the fresh-water species, we may legitimately conclude that such earth has been deposited by rivers or by lakes of fresh water. If, on the contrary, the beings that have there left their remains belong to the marine species, it may be presumed that such deposit owes its origin to the waters of the sea.

In latter years fossils have revealed remarkable facts concerning the state of the globe at various epochs. Some authors have sought to make use of them to define the shores and the configuration of the ancient seas; at least, we know that in the deep sea we find fewer molluscs than near the coasts; the depth and absence of vegetation cause the greatest part of the species to avoid the centre of the seas; the shores, on the contrary, which furnish a more abundant nourishment, and the rocks near the surface, serve as shelter to a much larger number of individuals. The presence of numerous fossils, and above all that of species which belong to the kinds essentially fluviatile, may then serve to indicate the shore of ancient seas, whilst rare fossils of species from the deep sea prove, on the contrary, that the earths where they are deposited have been formed far from the coasts of seas at divers epochs. Thus it will be seen that geology would be but a barren study without some knowledge of the fossil remains of those beings who apparently first peopled the waters of the earth.

An inspection of the various strata in which fossil remains have been deposited serves to prove that, in general, a constant order has existed in their formation. The sea, by which the entire earth appears to have been covered, having rested in certain situations a sufficient length of time to collect particular substances, and to sustain the life of certain genera and species of animals, has been afterwards replaced by another sea, which has collected other substances, and nourished other animals, whose remains are found in each stratum, and are generally limited to one formation, or, if reappearing in a successive stratum, much modified in size or structure. I have prepared here a diagram (page 446) which will give you an idea of the successions of epochs; each epoch containing a succession of periods and formations, which, though often found to have been disturbed by some vast convulsive force, can yet be retraced to its natural order of succession and super-position.

The diagram (page 446) shews those formations which constitute the secondary epoch, or, if described in ascending order, the commencement of that vertebrate existence which left unequivocal evidence of its inhabiting the earth, by leaving the imprint of its footmarks, which, at one time, was all we knew of the extraordinaty inhabitants of the New Red Sandstone, when it was called Chirotherium, from the hand-like shape of the foot-marks, until the mighty genius of Professor Owen placed the teeth and head before us, with such indisputable characters as united them to the footmarks, and thus, by induction, the whole animal was presented to us.

Next, in ascending succession, we have the Tethyosaurus, Platyodon, Tenuirostris, and Communis, the Plesiosaurus Dolichodirus, as restored by Dean Conybeare, the Plesiosaurus Macrocephalus and Hawkinsii, the latter named by Professor Owen after Mr. Thomas Hawkins, who with great enthusiasm cleared it from its matrix of lias, and made the first great collection of fossils of the lias which were purchased by the trustees of the British Museum, where they are now, and form the most striking features of the national collection of fossils.

It next illustrates the upper portion of the lias, sometimes known as the alum shale, so well developed at Whitby, in which remains of the Teleosaurus have been so frequently found. This animal will be recognised by its near resemblance to the crocodile of the Ganges called Gavial, or Garrial, as it should be called: to the casual observer the principal difference consists in its greater size. The next formation above the lias is the oolite, of which at present that singular reptile, the Pterodactyle, represents the inhabitants, while the intermediate formation, called the Stonesfield slate, bears the great discovery of Buckland, the Megalosaurus, or the great lizard. This, the upward strata of the great oolite, brings us to the formation called the Wealden, which Professor Owen, in one of his elaborate descriptions of the British fossil reptiles, calls the metropolis of the Dinosaurian order, which I have here represented by the best known and most typical species, the Hylæsaurus or lizard of the mud, with its extraordinary dermal covering and long range of dorsal scutes, of which the bones were found by the late Dr. Mantell, whose persevering researches in Wealden formations first gave the idea to science of the former existence of the Iguanodon.

These restorations of the Iguanodon I made from the measurements of the great Horsham specimen, as the largest is called, from its having been found and carefully preserved by Mr. Holmes, surgeon, at Horsham, who has bestowed much care and attention on the development of the great fossils found in his neighbourhood, among which are the largest known specimens of the bones of Iguanodon, having also the greater value of being found altogether, evidently belonging to one individual. These he kindly placed at my service for comparison with the better known Maidstone specimen now in the British Museum, which was so admirably extricated from its matrix and preserved by Mr. Beusted.

This Iguanodon was the animal the mould of which I converted into a *salle a manger*, and in which I had the honour of receiving Professor Owen, Professor E. Forbes, and twenty of my scientific friends to dinner on the last day of the year 1853. This circumstance will best illustrate the great size of these animals, the restoration of which has involved some of the greatest mechanical difficulties that can come within the sculptor's experience: and, if it will not be considered out of place, I will briefly state the process by which I have constructed these large models.

In the first week of September, 1852, I entered upon my engagement to make mastodon, or any other models of the extinct animals that I might find most practicable; such was the tenour of my undertaking, and being deeply im-

DIAGRAM OF THE GEOLOGICAL RESTORATIONS AT THE CRYSTAL PALACE.

Chalk.	*Wealden.*		*Oolite.* (*Stonesfield Slate.*)	*Lias.*		*Lias.*	*New Red Sandstone.*
Pterodactyle.	Iguanodons.	Hylæosaurus.	Megalosaurus.	Taleosaurus.	Plesiosaurus.	Icthyosaurus.	Labyrinthodon.

pressed with its important and perfectly novel character, without precedent of any kind, I found it necessary earnestly and carefully to study the elaborate descriptions of Baron Cuvier, but more particularly the learned writings of our British Cuvier, Professor Owen. Here I found abundant material collected together, stores of knowledge, from years of labour, impressing me still more with the grave importance of attempting to present to the eye of the world at large a representation of the complete and living forms of those beings, the minutest portion of whose bones had occupied the study and research of our most profound philosophers; by the careful study of their works, I qualified myself to make preliminary drawings, with careful measurements of the fossil bones in our Museum of the College of Surgeons, British Museum, and Geological Society; thus prepared I made my sketch-models to scale, either a 6th or 12th of the natural size, designing such attitudes as my long acquaintance with the recent and living forms of the animal kingdom enabled me to adapt to the extinct species I was endeavouring to restore. These sketch models I submitted in all instances to the criticism of Professor Owen, who with his great knowledge and profound learning most liberally aided me in every difficulty. As in the first instance it was by the light of his writings that I was enabled to interpret the fossils that I examined and compared, so it was by his criticism that I found myself guided and improved, by his profound learning being brought to bear upon my exertions to realise the truth. His sanction and approbation obtained, I caused the clay model to be built of the natural size by measurement from the sketch-model, and when it approximated to the form, I with my own hand in all instances secured the anatomical details and the characteristics of its nature.

Some of these models contained 30 tons of clay, which had to be supported on four legs, as their natural history characteristics would not allow of my having recourse to any of the expedients for support allowed to sculptors in an ordinary case. I could have no trees, nor rocks, nor foliage to support those great bodies, which, to be natural, must be built fairly on their four legs. In the instance of the Iguanodon is not less than building a house upon four columns, as the quantities of material of which the standing Iguanodon is composed, consist of 4 iron columns 9 feet long by 7 inches diameter,

600 bricks,
650 5-inch half-round drain tiles,
900 plain tiles,
38 casks of cement,
90 casks of broken stone,

making a total of 640 bushels of artificial stone.

These, with 100 feet of iron hooping and 20 feet of cube inch bar, constitute the bones, sinews, and muscles of this large model, the largest of which there is any record of a casting being made.

I have only to add that my earnest anxiety to render my restorations truthful and trustworthy lessons has made me seek diligently for the truth and the reward of Professor Owen's sanction and approval, which I have been so fortunate as to obtain, and my next sincere wish is that, thus sanctioned, they may, in conjunction with the visual lessons in every department of art, so establish the efficiency and facilities of visual education as to prove one of many sources of profit to the shareholders of the Crystal Palace Company.

DISCUSSION.

The Dean of Hereford said he had listened, as he was sure every one present must have done, with great interest to the admirable paper of Mr. Waterhouse Hawkins, who had brought before them many animals to most of them probably unknown, and so perhaps they would have remained, had they not been represented in this way. He should be glad to see those models multiplied at a price which would enable them to be introduced into village and ordinary schools, as every one could not visit the Crystal Palace, and he therefore hoped that specimens like those before them might be rendered attainable by those in remote and secluded districts, who would not have the advantage of witnessing the splendid and gigantic illustration of the extinct creation of the early ages of the world which would be there exhibited. He would also express a hope that specimens like those might be introduced in connection with the approaching Educational Exhibition of the Society, as it would be of great importance in an educational point of view, and schoolmasters and teachers of the young might thereby have an opportunity of seeing what had been done, and what they might do for themselves, if they could purchase those models at a moderate price. It would be doing for the extinct world what they had not done for the existing one, because, in many of the rural districts the young were taught the nature and habits of elephants, lions, and tigers, and yet had never seen either a living specimen or even an accurate model of those animals. He should now be glad to hear the observations of any gentleman upon the subject of the paper which had been brought before them that evening, and as he saw Professor Tennant present, perhaps he would favour the meeting with a few remarks upon a matter with which he was so intimately acquainted.

Professor Tennant observed, that he had but little to say after what had been stated in the paper, because to go through the various models exhibited in detail would occupy several hours. Having had on more than one occasion an opportunity of witnessing the process of building up the models of these monster animals, it was astonishing to see the skill with which Mr. Hawkins built up, piece by piece, those gigantic and extraordinary representations. When they looked at the bones on the table, and compared them with the thigh-bones of the largest animals with which they were now acquainted, they were taken by surprise, and it required the learning and erudition of a Conybeare or an Owen to re-create these extinct animals from detached fossil remains. Most persons present had, no doubt, seen the fossil Ichthyosaurus in the British Museum, which was 22 feet in length; but these beautiful models carried the mind back in time to the periods when these creatures were living in the seas which washed our own coasts. They were now standing upon an ancient sea-bottom, and the race of animals which then existed had been brought to light, for the most part, only in a fragmentary state, like the specimens upon the table. They reminded him of a circumstance which occurred a few years since, when a sailor brought home a small fragment of the bone of a gigantic bird from New Zealand. This was shown to Professor Owen, who, from the great anatomical skill which he possessed, was enabled to say that the bird a portion of whose bone that small fragment was, was so gigantic in its proportions that even the largest ostrich he had ever seen was as a mere chicken to it. There were persons present who might, perhaps, be inclined to criticise the statements laid before them that evening, as to the ability to reproduce accurate models of the entire structure and correct proportions of extinct animals from the discovery of a single bone; but they had the fact that Professor Owen was enabled to say, from the internal construction of the fragment of bone of only a few inches in length, that it was the bone of a gigantic bird. "Where did it come from?" asked the Professor. "From New Zealand." "Could more be obtained?" "No doubt of it." A request was made that as many of the bones as possible should be collected, and in the course of a few years the late Dr. Mantell received a quantity of them, and Professor Owen some more, and the result was, that they had now in the Museum of the College of Surgeons a restored bird, which measured about 14 feet in height. Happily for the researches of science, the bones of extinct animals, such as the gigantic Ichthyosaurus, were not found isolated. In some places the bones were found by hundreds. He had himself been to the quar-

ries in Wells, where the existence of the fossils in lias was first discovered by Mr. Thomas Hawkins, and he (Professor Tennant) was astonished to see the great number of bones in that mass of limestone. In this respect, again, he looked upon those models as most interesting. Owing to the facilities which now existed of visiting all parts of the country, and collecting fossils on the spot, and afterwards going to the Crystal Palace, and seeing the restoration of the animals, a more accurate knowledge of those wonders of creation was obtained than could be communicated by lengthened scientific details. They were not looking at the anatomical structure only, but they saw them clothed as it were in their original armour, many of them with gigantic scales, which scales had been found in the different strata. They found the fragment of a tooth, and they were enabled to state at what age that animal existed. A case occurred a few years ago, when he attended (accompanied by a Spanish gentleman), a meeting of the Microscopic Society. He was introduced to Professor Owen, who told the gentleman that if he could give him the section of a tooth he would give him the history of the animal. The gentleman looked incredulous, and remarked that he hoped that because he was a foreigner they were not imposing upon him, but he (Professor Tennant) assured his friend that the learned professor was entirely to be credited in his assertion. Standing a few yards off was Professor Loddage, the celebrated botanist. "If" said he "you will give me the tip of the feather of a bird, I will give you the history of the bird itself." The gentleman was still more perplexed, and replied, "Well, if this is the case, we will say no more about it." Well, therefore, might they say, upon a contemplation of this subject, "O Lord, how marvellous are thy works; in wisdom hast thou made them all; the earth is full of thy riches;" instances of which they had that evening exhibited before them.

Mr. Evan Hopkins (responding to the invitation of the chairman) said the only part to which he wished to draw attention, was that of the division of the zones. Supposing, for instance, they could cut a large section of strata of some 3000 or 4000 feet in England, they would find all the animals in their particular order, from the Silurian up to the tertiary formation. They knew the series from the organic remains; but when they went to other parts of the world things were not the same. For instance, take Australia, from which country he had just returned, that did not present any tropical remains. All the organic remains belonged to the south temperate zone. He was also well acquainted with South America; there they had a series of organic remains, but all belonging to the south temperate zone—none corresponding to the north. They had the different shells and organic remains belonging to Patagonia and Brazil, but not the rich exhibition which was found in England. In Ceylon, also, there were a variety of organic deposits, but the richest were found in the northern hemisphere, and as they proceeded to the south they dwindled away. He would not now enter into the question of place, because it was one so much of detail, but he wished to see this great science treated with regard to education in geology, and with that view he would suggest that in carrying out their splendid designs in this department, the Crystal Palace Company should exhibit a division of the zones: for instance, here the organic remains found in the south temperate zone, there those of the tropical, and there those of the north temperate zone. If that were done it would enlighten the mind upon the science of geology more than anything that had yet been accomplished in that way.

Professor Macdonald said he had listened with pleasure to the paper, and to the views which had been brought forward by the gentlemen who had taken part in the discussion, and he fully concurred in the advantages to be derived in an educational point of view, from a substantial as well as a visual representation of the remains of animals of past existence, which had been most successfully accomplished, as far as he was competent to judge, by Mr. Waterhouse Hawkins. He would confine his observations to what he conceived to be the more immediate object of his communication, in regard to these animals—restricted in the vast field of Palæontology, but, as Mr. Hawkins had said in his paper, interesting as being British. He had thought a great deal of the recommendation which had come from the chairman, and he hoped in his position in connection with this Society, he (the chairman) might be the means of inducing it—probably in connection with the Crystal Palace Company—to construct models of those remarkable creations, reduced to a reasonable, though not, perhaps, in the first instance, to an actual scale, that a moderate amount of models of all those animals that have been rendered so familiar to the people of London, and would be still more so when the Crystal Palace opened, might be made available for imparting instruction to the inhabitants of less favoured localities. He would suggest that some lighter and less brittle material should be used—papier-maché, or some such material—and the Iguanodon might, for instance, be reduced to the proportions of something like two or three feet in length, and other animals in like proportion. He was now speaking of his own *locale;* he wished his country neighbours to see the forms and models of the elephant, the tiger, the hippopotamus, and the giraffe, in something like their relative proportions. At the present day, in the better class of toy-shops, pretty correct models of these animals might be obtained, which gave a very fair idea of their forms, and would serve to convey instruction in natural history in a school. He was sure he expressed the unanimous feeling of the meeting when he stated that they owed a debt of gratitude for the interesting information that had been conveyed by Mr. Waterhouse Hawkins, and that all would concur in the suggestion of the very reverend chairman—that specimens of those models should be attainable for a moderate expenditure.

Mr. Harry Chester said he felt he had no right to address the Society upon this subject, and indeed all that had occurred to him had been anticipated by the very reverend chairman in opening the discussion, and by what had fallen from the learned professor who had just sat down, namely, that a great service would be rendered to education by multiplying the casts and illustrations before them. But there was one form of illustration which he hoped this subject would not receive, but which he feared would be the case, that was, that these monsters would find their way into their carpets and paper hangings. He would ask what would be the consequence, if a gentleman of not very strong nerves, on plunging into his bath found the bottom of it ornamented with some of these horrid-looking animals. But supposing that they kept them off their paper hangings, and out of their carpets, and did not stumble over them at their fire-sides, no doubt much important service might be rendered if these models were put into a form in which they would be easily attainable by those engaged in education. There was not a normal school but might have them. He thought it would be highly desirable that a stall should be occupied by these casts at the approaching Educational Exhibition of the Society, and it would be of great service if Mr. Hawkins would at a convenient period, deliver a lecture or read a paper upon them, for the benefit of the large number of schoolmasters and schoolmistresses who, he hoped, would be attracted to that exhibition from all parts of the country. The very reverend the chairman had expressed the want in the country of proper ideas of the forms of elephants, lions, tigers, and giraffes. Now, in a town like that of Hereford, he (Mr. Chester) was sure that upon such an intimation being made known, they would be inundated with travelling menageries, containing living specimens of those animals. He would mention a curious fact, which would illustrate the extent of information on these matters in some parts of the country. A schoolmaster came to

London accompanied by one of his most promising pupils, and for the first time in his life the boy saw a soldier with a bearskin cap, upon which the youth exclaimed, "Here's a man whose hair has grown through his cap." Before he sat down, he desired, on the part of the Council of the Society, to reiterate the statement which had been expressed that evening, namely, constant sympathy and co-operation between the Society of Arts and the Crystal Palace Company; and he was proud in thinking that many gentlemen who were most distinguished in that magnificent design were also members of the Society of Arts, just as the original promoters of the World's Exhibition in 1851 were also distinguished members of this Society. He hoped the same friendly co-operation would always exist, and that they would do all they could to promote each other's success.

Mr. Alexander Campbell remarked that it was matter of great satisfaction to find gentlemen like Mr. Hawkins and others of the same school, desirous of conveying correct ideas through the visual organs in the process of education, which, experience had proved, made a greater and more lasting impression than could be imparted by the auricular organs. He considered great credit was due to Pestalozzi for the introduction of the system into the schools in Switzerland. But, during the reading of the paper and the observations that had been made, it occurred to him that there were other circumstances, of even still greater magnitude, and more lasting importance, in connection with the science of geology, than had been realised that evening, except in a very partial manner. He meant the knowledge which was necessary to be communicated, at the same time, in respect to the state or condition of the earth which had produced these animals. They saw the immense magnitude of those animals in comparison with anything which existed at the present time; and science compelled them to the conclusion that the earth was at that period in a different condition, with regard to the other celestial orbs forming the planetary system, to what it now is. Upon the subject of the zones, Mr. Campbell remarked that it was known to philosophers that the earth's zones are in a constant state of change, because it had been demonstrated that evening that, at the time those animals existed upon our own sea-girt isle, this portion of the earth must have been in the midst of the torrid zone; and it had been demonstrated beyond all doubt that what was now called the north polar zone was at one time the frigid portion of the other zone; so that the earth was constantly changing its zones, and changing the productions of those zones in proportion to the revolutions they experienced. It appeared to him that the mode of imparting education which had been advocated that evening was one deserving of especial encouragement by the Society of Arts.

The Chairman having moved a vote of thanks to Mr. Waterhouse Hawkins for his able and interesting paper, that gentleman acknowledged the compliment, and stated his readiness to lend his aid in carrying out the suggestions made for multiplying the models in a form which would render them attainable and useful to society at large, and also his readiness to contribute any models he had to the forthcoming Exhibition.

The Secretary announced that the following arrangements had been made for the remainder of the present Session:—

May 24.—Mr. S. W. Leonard, "On the Microscope, as applied to Art, Science, Manufactures, and Commerce."

May 31.—Mr. R. A. Slaney, (late M.P. for Shrewsbury,) "On Limited and Unlimited Liability in Partnerships."

June 7.—Dr. T. King Chambers. "Industrial Pathology; or the Injuries and Diseases incident to Industrial Occupations."

June 14.—General Meeting to receive the Council's Report and Statement of the Funds of the Society.

July 5th.—General Meeting for the Election of Officers.

ASHBURTON PRIZES, 1854.

The following are the questions at the examination for the Ashburton Prizes, for proficiency in the teaching of "Common Things," held for Schoolmasters, at Southampton, by the Rev. W. H. Brookfield, H.M. Inspector, and for Schoolmistresses, at Salisbury, by the Rev. W. P. Warburton, H.M. Inspector, on 21st April, 1854.

Two Questions to be answered out of each Section, and others as Time may permit.

SCHOOLMASTERS.

Morning—Three Hours allowed for this Paper.

Section I.

1. Define the following words and phrases, and illustrate your meaning by their usage in matters of social life:—skill—industry—economy and forethought—wealth—money—value—price—labourers and employers of labour—capital and capitalist.

2. What is the usual consequence of an abundant or deficient harvest upon the price of food? and upon the wages of labour?

3. What is meant by division of labour? and show the importance of this in advancing the wealth and the well-being of a nation.

4. What are the principal conditions of industrial success among the labouring classes, and what kind of training in early life is most likely to lead to it.

5. What are the necessary qualities of the food of a people, in order that the supply may be permanent? and how do foods for man and beast vary in this respect.

6. What metals are the most useful? Mention the particular properties which make them so; and give the outline of a lesson on iron or lead, and its uses, from the state of ore up to a knife-blade, or sheet-lead.

Section II.

1. Point out the different ways in which the air in a dwelling-room is rendered impure, and the best way of ventilating the room?

2. What are the best materials for building a cottage; the necessary conditions of health with reference to the building; and which is preferable, a slated or thatched roof, and why?

3. What vegetables are usually cultivated in a garden? Which do you consider the most nutritious? and why? What rotation of crops would you recommend in a garden of one rood in extent?

4. What is the difference between porous and retentive soils, and how would you treat them? Explain the principle on which soils pulverize after frost, and the advantages of this.

5. Explain what is meant by a proper rotation of crops—by exhausting and non-exhausting plants. How would you ascertain what substances plants draw from the soil? and, having done this, how would you manure the land?

Section III.

1. What are the essential properties of matter? Define and explain some of them.

2. Explain what is meant by the attractions of cohesion and gravitation, and exemplify by giving instances of each.

3. Give Newton's three laws of motion, and illustrate the last by experiment.

4. What is meant by centripetal and centrifugal forces? and show how in different latitudes the weight of bodies is affected by the latter.

5. A body let fall from the top of a tower is 3 seconds before it reaches the ground; how far did it fall in each second? and what was the height of the tower? If the action of gravity ceased at this point, how far would it fall in the next 3 seconds.

SECTION IV.

1. To which of the mechanical powers do the following implements belong:—a spade and fork in digging—the plough—the saw—the axe—a pair of scissors—a pump handle—the screw? Give your reasons in each case.

2. Explain the principle of a pair of scales, and of a common steel-yard.

3. Explain the principle of the wheel and axle, and show how it is applied in raising up water from a well.

4. Show the use of the plumb-line, the square, and the spirit-level to the bricklayer and carpenter.

Afternoon—Three Hours allowed for this Paper.

SECTION I.

1. What are the principal bones of the human skeleton? How are they kept together at the joints; and of what substance are they composed?

2. Explain the construction of the spine, or of the hand, and the mechanical contrivances for the different movements which they are intended to perform.

3. How would you judge of the habits and food of animals from their jaws and teeth? Illustrate your answer by examples.

4. What are muscles and tendons, and their uses in the animal frame? And in the movement of one bone against another in the joints, how is it they are not worn away?

5. What is the cause of a defect in vision in what are called short-sighted and long-sighted persons, and what kind of glasses are required to correct it in each? What are the purposes of eyelids and eyelashes?

6. Point out any differences in the eyes and ears of animals which show adaptation to their respective wants.

SECTION II.

1. What is the difference between an artery and a vein, between arterial and venous blood; and why is the cutting or rupture of an artery more dangerous than a vein?

2. Give your reasons for thinking that exercise is necessary, and generally beneficial to all the animal functions.

3. What is meant by respiration? Explain how the chest expands and contracts in this process? And in what does the air breathed out from the lungs differ from common atmospheric air? What experiment would show this?

4. Does the blood undergo any and what change in circulating through the body? And explain the functions of the heart, arteries, and veins in this circulation.

5. What are the properties of milk as a food, and the substance it contains? Is it equally good at all periods of life?

6. What analogy is there between the blood of animals and the sap of vegetables? In each case mention as many substances as you can for forming which they must contain the materials?

SECTION III.

1. What are the constituent parts of the atmosphere? How are they combined, and in what way are they subservient to the wants of animal and vegetable life?

2. What is meant by the specific gravity of bodies: and under what conditions is water taken as the standard? How would you ascertain the specific gravity of substances heavier and lighter than water?

3. Explain the principle and construction of the common barometer: when the mercury stands at 28.7 inches, at what altitude would the water stand in a winter barometer?

4. Describe a common Suction Pump or Syphon; and explain the principle of their action?

5. A vessel will float on water whose specific gravity is 1, with a burden of 200 tons: what weight of cargo would it carry if floated on sea-water, whose specific gravity is 1.035—or on mercury?

SECTION IV.

1. What is meant by the terms "warm" and "cold;" and why do not all substances of the same temperature feel equally so when touched?

2. What is the general effect which heat has upon matter; and what are the different ways in which solid and fluid bodies are heated?

3. What are the phenomena attending the melting of ice, and heating the water till it boils away in steam?

4. Explain how dew is formed, and its effects on vegetable life. Why does it not fall equally on grass and gravel?

5. What is meant by the number of inches of rain which fall during the year at any particular place; and how is this ascertained?

6. What is meant by the solvent power of water? Enumerate the substances you know to be solvent in it. How does it affect the growth of plants and animals?

SCHOOLMISTRESSES.

Morning—Three hours allowed for this paper.

SECTION I.

1. Define the following words:—skill—industry—economy, and forethought—wealth—money—and illustrate your answer by their application in matters of social life.

2. What are the principal conditions of industrial success among the labouring classes, and what kind of training in early life is most likely to lead to it?

3. What are the advantages of paying ready money in your dealings, and the disadvantages of the contrary practice?

4. What are the advantages of clothing-clubs for the labouring classes, and how ought they to be conducted?

SECTION II.

1. What are the necessary conditions of a cottage, in order that it may be healthy and comfortable? What is the use of a fire-place in a bed-room?

2. Give some of the various ways with which you are acquainted of preserving meat or vegetables, so as to lay them up in store for future use.

3. Of the modes of cooking animal food—roasting, boiling, stewing—which do you consider the most economical, and why?

4. What are the nutritive properties of milk? Explain the processes of making butter and cheese, and the way in which they must be treated in order to make them keep.

5. What do you consider a proper and economical diet-table for a week for a family, consisting of a man, his wife, and 4 children, earnings 12 shillings a-week?

SECTION III.

1. What is the difference between an artery and a vein—between arterial and venous blood?—and why is the cutting or rupture of an artery more dangerous than a vein?

2. Does the blood undergo any and what change in circulating through the body? and explain the functions of the heart, arteries, and veins in the circulation.

3. What are muscles, tendons, and nerves, and their uses in the animal frame?

4. How would you treat a scald or burn?

5. Give your reason for thinking that exercise is necessary and generally beneficial for health.

6. What are the advantages of cleaning the teeth daily? and what are the disadvantages of loosing them or of their decaying in early life?

Afternoon—Two hours and a half allowed for this Paper.

SECTION I.

1. Draw out a series of lessons on domestic economy, such as you thing would prove useful to the elder girls of your school, and describe one lesson in the way you judge necessary to impart it.

2. In what respect do you perceive the homes of your scholars to be deficient, and the teaching of your school to act as a remedy?

3. Describe the manner in which you conduct the needle-work of your school. What distinction do you make between the useful and the fancy work which the children do?

4. Give an outline of a lesson on soap, and its uses.

5. Give your reasons (if any) for regarding a popular knowledge of the atmosphere, water, heat, gases, animal economy, &c., as not unsuited to girls?

SECTION II.

1. What is meant by "hard and soft" water? what is the cause of it? and what are the effects of hard water in cooking and washing?

2. What kind of substances are removed by filte n g and by boiling water? Explain the process in both cases.

3. Why do woollen things shrink when washed?

4. What are the advantages of woollen and cotton things as clothing for the labouring classes over linen? and why is cotton preferred in warm climates?

5. What is the best teapot to use, and why?

ENGLISH WORKMEN IN FRANCE.

The following notice appeared in a recent number of the *London Gazette*:—

"Home Office, Whitehall,
May 5th, 1854.

"Whereas many English workmen have lately proceeded to France in search of employment, and having failed in obtaining work of any description, have fallen into great poverty and distress, and have suffered much misery and privation; all such persons, intending to go over to France for the same purpose, are hereby cautioned and warned of the inconvenience to which they will be exposed, unless they shall have entered beforehand into some contract or engagement with some person in France, who is able to employ them: or unless they shall, before leaving their own country, have provided themselves with funds sufficient to preserve them from want while abroad, and to enable them to return, if they cannot find the employment they have sought for."

Home Correspondence.

ON THE EXAMINATION OF MEMBERS OF LITERARY AND MECHANICS' INSTITUTES.

Sir,—The examination of members of Literary and Mechanics' Institutions is of great importance, and the Institutions in Union should furnish as much information as possible on this subject before the Conference in June next. It would be desirable to know how these proposed examinations would be received by the working classes. It is rather difficult to define these classes. I have heard clerks, linendrapers, butlers, and waiters, call themselves working men, and so they are; but by working men I mean that large producing class whose successful industry now depends upon a more extended knowledge of those physical and other laws upon which their various industrial occupations depend.

These examinations will give a more practical and useful character to Institutions, they will advance the education of the working classes, and develope the idea which first called these associations into existence. During the past fourteen years the character of Institutions has entirely changed, the word, "lecture," is changed to the more attractive word "entertainment"; and light literature takes the place of more solid and useful reading. The educational character of Institutions is almost lost. The middle classes will not associate with working men, and in this respect they are much worse than the aristocracy; I have seen noblemen talk and shake hands with a labourer, but a respectable tea dealer is above this sort of familiarity. Hence we often find in small towns an Athenæum and a Mechanics' Institution. The former is a kind of middle-class club, the other a place where knowledge is often pursued under many difficulties. The first Mechanics' Institution with which I was connected numbered about 200 members, all working men chiefly belonging to the same firm. We had a course of lectures on chemistry, the steam engine, and mechanics; admission to these lectures for non-members was twopence. I never heard of any complaint about these lectures not being well attended; on the contrary, we were obliged to move twice in one season, because the lecture-room was not large enough. It is but right to remark that most of these men had attended classes where the elements of these subjects had been previously taught, but they never had an opportunity of obtaining more information at these classes than what is within the reach (where there is the disposition) of every boy in our elementary schools. Although I never had the advantage of a regular and systematic course of study, the information I obtained at these classes and lectures has been very useful; I can recollect the experiments and trite sayings of the lecturer as though they were of yesterday. The next winter I had made up my mind to work in regular order; I was not actuated so much by a love of study, as a desire to succeed an old gentleman who had a very comfortable situation as a lecturer on these subjects, at a neighbouring college. My hopes were all frustrated. The Mechanics' Institution became a Political Society; lectures on Steam Engines gave way to subjects of a political character, which were often discussed under painful and exciting circumstances; the thoughtful and prudent left the management of the Institution to the young, the enthusiastic, and the ignorant. The useful character of the Institution disappeared, and demagogues took the place of teachers. I look back upon the three years that followed with feelings of the deepest sorrow and regret. This period has happily passed away, and I believe all the really faithful are now turning their attention with great sincerity of heart to those social and educational reforms upon which the true elevation of the working classes is based. Local circumstances will in a great measure determine the particular character of Institutions; there will be a wide difference between an Institution at Battersea and one in a manufacturing town. A large number of the members of our Institution go to London every day on business. On their return home in the evening they go to the reading room, to look at the papers, and enquire the latest news in the City; but in addition to this class (which we do everything we can to accommodate), we have a considerable number of working men who would gladly avail themselves of any opportunity for improvement; and as soon as such a scheme as that proposed is carried into operation, it would induce other working men to join the Institution. I once belonged to an Institution where a drawing class was established; after a lingering existence of six months it failed; now its failure appeared to me attributable to a mistake in the kind of drawing. The mechanics in that neighbourhood required a knowledge of mechanical drawing suitable for plans, but they were taught curves

and scrolls. Classes must be formed to prepare men for the proposed examinations; the teachers must possess all the qualifications of a good schoolmaster, and as no man can teach every thing efficiently, separate teachers will be required for some of the subjects. It will be utterly impossible for small Institutions to meet the expences of such a system of instruction. The voluntary principle will not provide the money, and working men cannot afford it. A Parliamentary Grant, administered through the Department of Practical Science, upon a similar principle to the Educational Grant, might overcome this difficulty. After we had provided efficient teaching power, the next thing would be to prescribe some definite course of study for those who intended to present themselves for examination. The subjects for examination should have special reference to those branches of industry in which the candidates were engaged.

Every man who presented himself for examination should first pass a preliminary examination on the following subjects—Reading, Writing from dictation, Arithmetic, and the Elements of Political Economy; a fair knowledge of these subjects should be considered indispensable. Any two or three of the following subjects might be taken for special examination—Geometry and Mensuration, Plan Drawing to Scale, Mechanics and the Elements of Mechanism, the Elements of Chemistry and Natural Philosophy, and Physiology, so far as it related to the laws of health.

There are many gentlemen connected with the Society of Arts who would be able to select a very good list of text books on these subjects. The details of the examination might be easily arranged. As a general principle the method adopted in the examination of schoolmasters would answer very well.

The mere possession of a certificate, which stated that the owner had passed a certain examination in such and such subjects, would not be a sufficient inducement to go through the labour necessary to acquire it. Few schoolmasters would try year after year for a certificate, were it not for the pecuniary advantages belonging to it. There must be some substantial reward. Vacancies in the dockyards and other government establishments should be filled up by the appointment of men who had passed these examinations. Unless some encouragement of this kind is held out, I fear one of the best propositions for the elevation of the working classes will (at least, for the present) be entirely lost. I have thrown these remarks hastily together, with the hope that it may induce other Institutions to give the benefit of their opinion and experience on this important subject.

J. C. BUCKMASTER.

ON THE DECIMALIZATION OF COINS AND ACCOUNTS.

SIR,—I shall esteem it a favour, if you will allow space in your valuable and widely-circulated Journal, for a few remarks on Mr. Wm. Miller's essay, published in your number for Friday, the 5th instant.

1. Being an advocate, as Mr. Miller is, for the introduction of a uniform decimal computation in the measures, weights, and coins of this country, I only regret that, as Mr. Miller quoted a few of the recent English authors who have recommended and illustrated that method, he did not observe, in addition, that the merit of having introduced it into modern Europe is entirely due to the French. This important principle engaged the most serious attention of the Commissioners who were appointed by the French government to consider the subject in the latter part of the last century, and these very eminent and most competent judges, having deliberated with the utmost care and diligence upon the whole question, resolved, that a system of measures, weights, and coins, conformed to the decimal arithmetic established among all nations, was preferable to any other. Their recommendation was adopted in the year 1794, and became the basis of the system now employed.

2. Mr. Miller brings forward a scheme for the improvement of our weights. Instead of our present system, which possesses unity of plan in so far as it is all founded upon the weight of the grain, he proposes the adoption of two decimal systems, the one founded upon the pound avoirdupois, and the other upon the ounce troy. In this country the metrical, or French system, founded upon the gramme, is already employed for scientific purposes, and will certainly continue to be used in operations which require delicacy and correctness, or which are intended to be understood by foreign philosophers. Moreover, we now read of kilogrammes in all our daily newspapers, and our intercourse with the countries which weigh by grammes and kilogrammes is so frequent, that a large portion of the English nation must soon become more or less familiar with them. I know an eminent professor of medicine in London, who directs all his students to make themselves acquainted with these weights. The reason is, that, besides being in themselves the best, any patient who went abroad with a prescription drawn up in grains, scruples, and drams, would find it useless as soon as he had crossed the Channel. If, therefore, Mr. Miller's proposal be adopted, three different systems, two of them new, and the other already established, will be employed; and this will produce no small amount of labour and confusion.

In the earlier part of his paper Mr. Miller favours the idea of considering our own practice independently of the methods of other countries; but here we find him sliding into the principle of accommodation; for he argues in favour of the pound avoirdupois, that "it is the weight of all the German nations, and has been so from time immemorial." With respect to the matter of fact, I regret to say Mr. Miller is in error. One pound (*pfund*) is used in the north of Germany, another in the south. The Hans Towns have a different pound from the provinces of Prussia. The English pound of 7000 grains, "a weight," as Mr. Miller observes, "entirely new," is probably unknown throughout all Germany. But, supposing the English and German pounds to be any where identical, I would ask, if we are to accommodate ourselves to other nations, why should we not aim at agreeing with our nearest neighbours, the French and the Belgians, rather than with the Germans, with whom we have far less intercourse? I am informed that the Germans themselves are disposed to act upon this principle. Those of them who are contiguous to France, viz., portions of the Kingdom of Bavaria, and of the Grand Duchies of Baden and Hesse Darmstadt, are now devising regulations for the introduction of the French measures and weights.

3. We now come to the principal design of Mr. Miller's essay—the alteration of our money. Here, he says, "A system of currency should stand upon its merits in relation to all classes: if this decimal system be not good for all, it is good for nothing." Having stated this important principle, Mr. Miller joins in the advocacy of a scheme which many have condemned, because, though convenient for merchants and bankers in this country, it would be injurious to the poor, and almost impracticable among the great masses of the people. I cannot better illustrate my meaning than by taking Mr. Miller's own example, viz., the sum of £900 9s. 9¼d., expressed in three modes, the pound (which is his mode), the shilling, and the penny; but to these three modes, which exist only in idea, I will subjoin the franc mode, which I recommend, and which is already in use even to a far greater extent than our present mode of pounds, shillings, pence, and farthings:—

Present mode	.. ...	900*l* 9*s*. 9¼*d*.
Pound mode	... ...	900.489*l*.
Shilling mode	... ...	18009.78*s*.
Penny mode	... ...	216,117.25*d*.
Franc mode	... ...	22692.32*f*.

As representations of the original sum of English

money, all these four modes are incorrect except the penny mode, which is supported by the recommendation of Mr. Headlam and Dr. J. E. Gray. According to Mr. Miller's table of present values, the pound mode ought to be 900.4884816*l*. He has made it more than half a mil above its true value. I consider it as one recommendation of the franc mode, that, in as far as a centime is smaller in value than a mil, it enables us, as in the present instance, to represent almost every amount with greater exactness. But my chief objection to the pound mode, as compared with the three others, is, that although it does not descend low enough in the expression of the smaller values, it requires three places of decimals, even for the work which it undertakes to do. I believe that such a method would be found intolerable in practice. The experience of all civilised countries shows that persons, even the poorest and rudest, have no difficulty in counting by tens. Among ourselves we speak, even by preference, of 13 pence, 14 pence, 15 pence, &c.; and the French and Belgians continually reckon their small payments by introducing any number of centimes, such as half a franc, = 50c.; a quarter of a franc, = 25c.; or the smaller amounts of 20, 15, 10c. &c. But I think it evident that the pound mode, as proposed by Mr. Miller, in which the pounds might be followed by any number of mils up to 999, would be perplexing even to good arithmeticians, and quite unmanageable by all besides. I here speak not of sums written down, but calculated by memory, or in the head; and my objection is the same which Mr. Miller himself has advanced (p. 418,) in reference to weight, that "the same quantities would require *three places of decimals* to express them." If I am right in this objection, it follows, as Mr. Miller does not propose more than two denominations, viz., pounds and mils, that his method must be abandoned. Although it would have, in a majority of cases, the advantage, as shown in his statement, of requiring one figure less than the other modes, I think that the monied interest ought to submit to this trifling inconvenience for the sake of the immense benefits which would ensue to all classes from the adoption of the franc mode.

I cannot conclude these observations without expressing my admiration of the diligence evinced by Mr. Miller in his historical statements, and of his ingenuity in his proposed management of our copper coinage, and my wish that a gentleman of so great acuteness and intellectual activity would pursue the subject in a still more comprehensive and philosophical spirit, and especially that he would bestow upon the whole *systeme métrique* the attention to which I think it most justly entitled.*

I am, sir, yours most respectfully,
JAMES YATES.

Highgate, May 13th, 1854.

DECIMAL NOTATION OF MONEY.

Sir,—In the "Journal" of the 28th April, there is a notice of a paper on the Coinage, read by me at the Pembroke Dock Mechanics' Institute, but as there is no account of my proposal for a decimal notation, I beg to be allowed space for a brief outline.

To accomplish the desired reformation without disturbing the existing notions of value, or altering the names of the various pieces of money at present in circulation, nothing more would be necessary than for the government to enact that henceforward all accounts should be rendered *in terms of one denomination only*, according to the following table :

The farthing to be set down as ...	1	coin.
The halfpenny	2	„
The penny	4	„
The "sixpence"	25	„
The shilling	50	„
The florin	100	„
The half-crown	125	„
The crown	250	„
The half-sovereign	500	„
The sovereign	1000	„

Since twenty shillings weigh very nearly 4 oz. avoirdupois, the coin of account might be defined as the thousandth part, namely 14 grains, which would be represented by a copper token 40 times its weight, *i.e.* 70 grains. The current farthing when new weighs 72 11-12ths grains, but after a little wear is no heavier than the proposed token, so that the existing copper money might continue in circulation, and the trifling depreciation of its value as compared with the silver money would scarcely be felt. Indeed by the poorer classes the additional halfpenny in change for a shilling would perhaps be regarded as a bonus on their small purchases. Something has been said by the Parliamentary Committee about a probable loss to the government, but it should be recollected that at the Mint, about 9 pennyworth of copper is coined into 24 pence, leaving a handsome profit of 166 per cent. or thereabouts to the government.

In exchange transactions foreign money would be easily reduced to "English coins," which from the great commercial importance of this country would probably become the universal standard of value; a franc, for instance, might be reckoned 39 coins, a rupee 98, a dollar 219, a ducat 418, a thaler 148, and so on, according to the rate of exchange for the time being. The rule of "Exchange" in arithmetic would then be reduced to an operation of simple multiplication.

As the term "pound," when speaking of money, would be a synonymous with 1000 "coins," it might be legally retained in business transactions, *a thousand pounds* being certainly a more convenient expression than *a million coins.* Silver 10-coin and 20-coin pieces might be issued with advantage, and the threepenny and fourpenny pieces called in

I remain, sir,
Your obedient Servant,
SAMUEL A. GOOD.

H. M. Dockyard,
Pembroke Dock,
15 May, 1854.

DRAWING INSTRUMENTS.

Sir,—As a manufacturer of drawing instruments, I beg to make the following remarks with reference to some cases of instruments examined by me at your office this day, the price of which is certainly very low, but such instruments would be dear at any price. The object of the "Society of Arts" is very praiseworthy in encouraging the supply of the poorer class of students in the various departments of science and art, with drawing materials at a low cost, but it is an established fact that, the less the ability of the student, the better drawing materials he requires. The various government and other large establishments have tried the experiment of introducing cheap instruments without success, and the general conclusion is that a bad instrument is dear at any price, and does much to retard the progress of the student. The competition and the demand for all drawing materials is so large that the public secures a cheap and good supply; and I regret to add that the encouragement of the manufacture of cheap instruments, &c., has already deteriorated the value of English manufactures in our colonies and America, and the French and Germans are rapidly advancing to our former position in the supply of instruments, cutlery, and many other articles, which already is felt by the working-classes in our business as well as others. With respect to the instruments examined, the following are the

* Recent and authorised accounts of the system are contained in the following works :—
Poids et Mesures, Monnaie, Calcul Decimal, et Verification. Par M. Tarbé. Paris, 1845. 12mo. (Price 3f., a Volume of the *Encyclopedie-Roret*.)
Manuel Populaire et Classique des Poids et Mesures. Par L. Daléchamps, Paris. 12mo. (Price, 3f.)

objections:—The joints being made entirely of brass will last a very short time, and will never work smoothly; the middle plate should be steel, but gun-metal or iron would be better than brass, and being made of sheet brass soldered together in *three pieces* the soldering makes the metal very soft; the tubes and joints are so weak that there is so much spring in them that it is almost impossible to take a correct length from the scale, and very difficult to describe a circle at all accurately. The points of the pens are so weak and badly fitted into the upper part, that the slightest pressure on either side will throw the nibs across and prevent the pen drawing a line, and being hollow on the inside of the nibs the pen will be useless when worn to the hollow, and very difficult to keep clean. The joints and screws of all the specimens are badly made; not one works evenly; the rules are incorrect; and the protractors have no zero marked on the fiducial edge; the scales being made of card, are subject to every variation of the atmosphere, more than wood or ivory; the point of the ever-pointed bow pencil is too long, and, if it wears away, will be too short to use. There are many other faults, which any person understanding the use of them will readily detect.

Yours, &c.,
A MANUFACTURER.

May 15.

WARMING AND VENTILATING DWELLINGS.

SIR,—Few people have wrought harder, more benevolently, and what is better, more beneficently, at the public service than Dr. Arnott; and his last endeavour to introduce an economical stove to consume smoke, applicable to all dwelling houses, is worthy of all praise.

The principle of burning smoke, by supplying fresh coal fuel beneath, and not above, the incandescent mass, has probably always been known, but was, I believe, first promulgated in print by Count Rumford, who also first introduced the register, or upper valve, to regulate the draught of the fire and direct the radiation into the apartment.

Thirty years ago Cutler patented and brought into use a "gas stove," in which the day's supply of coal was placed in a box, sunk below the level of the hearth, beneath the fire-place, and projecting a little above it, so that the fire was kept very low. As the coals burned away at the top they were raised, with the moveable bottom, by means of a winch, from time to time. The late Mr. Farey had one of these in use for many years, and *it was never out of order*. I have been informed that these stoves were applied to all the rooms in the Pavilion at Brighton, and they certainly were extending in use when the patentee commenced an action against some other makers, who were infringing his patent. The result was, that the patent was set aside by the judge, on the ground of want of novelty. The patentee thereupon, on his return from the court, gave orders to his foreman to break up all his patterns. He abandoned the trade, and left it in the hands of his rivals and the public. In a few years from that time the manufacture wholly ceased. It was alleged that the stoves were apt to get out of order, by the coals coaking and jamming in the box. It is quite clear that this must have been owing to imperfect manufacture.

Fuel economising then lay in abeyance till Dr. Arnott produced his close stove, arranged to burn anthracite coal, either with a thermometer, or hand adjustment, to regulate the admission of air and the consumption of fuel, either by self-acting or other process. There is no doubt that, for the purposes for which Dr. Arnott intended it, this stove was thoroughly efficient; and in his work he specified the various modes of constructing it, with a sufficient heating surface to warm a given number of cubic feet of air. But it was not patented; and under shelter of the Doctor's name, all kinds of people set up the trade of making the new stoves, promising far greater results than ever the Doctor himself had proposed to attain. Some would gravely undertake to warm a church with a box a foot square; and occasionally made explosions with bituminous coal gas therein; and of all this ignorance the blame was attributed to Dr. Arnott. Had he taken a patent he might have dictated the exact construction, and regulated the price to his own satisfaction, without charging a royalty to the public, and the constant production of good stoves for fourteen years would have prevented the growth of the spurious varieties.

Dr. Arnott has now produced an open stove similar to Cutler's, involving a better mode of construction, by the more careful exclusion of air below the coals, and a throttle-valve in the chimney, instead of the ordinary register, combined with back and sides of fire-brick, all elements of economical and good construction.

Mr. Chadwick and other speakers dwelt strongly on the importance of Dr. Arnott having given this stove gratuitously to the public by not protecting it, as though a power in the hands of a benevolent man to protect his own invention must necessarily oblige him to tax the public for its use. I will venture to predict that Dr. Arnott's repute will have the effect of bringing forth a large number of makers, who will disappoint the public and throw discredit on the plan. If Dr. Arnott had protected it—supposing it patentable—and ensured the efficient manufacture, he would have better served the public than by merely making it notorious and leaving it at the mercy of all and sundry. If holding the patent without a wish for profit, he would thereby have ensured to the public the perfect article at a fair price. I doubt very much whether Mr. Chadwick and the whole Board of Health combined can ensure the genuine article against spurious competition by any stereotyped form.

What are the requirements to keep a sitting-room in a state of healthy warmth?

1. That the air be as nearly pure as possible.
2. That it be constantly changed as fast as breathed.
3. That it be in the condition of warmth best adapted to be breathed by the lungs according to the condition of health of the inhabitants of the apartment.
4. That the ingress of the fresh air be from above, and with its flow subdivided so as to prevent draughts injurious to the body.

Sixty to seventy degrees will answer well for healthy persons with good circulation, or with the body in occasional movement.

No contrivance in a single room can be so efficient as a system of warming the whole house, which will entirely prevent draughts in rooms. It is clear that draughts are produced by cold, dense air rushing in to supply a comparative vacuum caused by warm air of greater rarity. If the general air of a house be of one temperature these draughts will cease.

Such a temperature may be obtained by the use of Dr. Arnott's close stove, or by hot-water pipes or vessels, or by steam pipes or vessels, taking care that in all cases the heat of the warming surfaces be not sufficient in intensity to decompose the impinging air, *i. e.*, burn it, and that the surfaces be of sufficient extent to warm the air to the right temperature.

All these are processes of private production of warm air; and, were we further advanced in the science of dwellings, they would probably be superseded by public buildings erected for the purpose of supplying pure warm air to a given number of dwellings, just as water or gas is supplied. The power that supplies the "hot air blast" to furnaces, could easily be modified to produce a warm-air flow to houses, with the greatest possible economy of fuel, with its entrance below and exit above.

But, in addition to accomplishing the warming the general atmosphere of a dwelling to a constant summer warmth, there is another consideration. Persons of studious and sedentary habits have very rarely a perfect circulation of the blood. Sitting in a room, they do not inhale sufficient oxygen thoroughly to heat the blood,

drive it to the extremities and back again to the heart. They labour under cold feet. In this condition the brain and nerves are not in the best state for mental operations, because the digestion is impaired, and impaired digestion is but another word for incipient paralysis. The common remedy for the evil of cold feet is to apply direct heat to them by foot-warmers, or by the radiant heat of an open fire, the latter being the most convenient and pleasantest. This process is in reality analogous to the artificial circulation of warm water in pipes by a furnace,—the radiant heat acting as a furnace fir to the feet to drive back the blood to the heart.

To obtain this radiant heat for the feet in the best mode, the practice has obtained of keeping down the fire-grate as low as possible on the hearth. And this practice slowly arrived at from time to time, and empirically kept up, is founded on reason. The rays of heat that strike furthest into the room are those of an angle of 45° with the wall, *i.e.* the horizontal rays. Therefore, a grate level with the floor, and a low-fronted fender, would be best adapted to warm the feet. But it is urged against this that the lower the grate the lower are the draughts of air rushing across the floor to the fire, and, consequently, the colder the feet. But this is not the fault of the fire, but of the mode of feeding the fire with air. If the air be brought by a pipe directly below the fire, the draught may be adjusted exactly like a furnace, and, in such case, with the general air of the house warmed, there would be no draught whatever across the room. If the low position of the grate necessitated draughts, and the only object of the open fire were to warm the air, it would be better to set the fire-place half way up towards the ceiling.

To make sure of obtaining the greatest possible amount of heat from the fire-place direct to the room, it is essential that the fire should be contained in an absorbent, and not in a conducting material—fire brick in preference to iron. The common register stoves of iron, commonly and carelessly set with hollow spaces behind the iron, are the most difficult to light, and the most effective to carry the heat up the chimney. The iron must be thoroughly warmed before the fire can burn well, or throw out heat. Fire-brick absorbs heat, and retains it for a long time, gradually giving it out. The register stove has its top made at an angle to refract the fire, but the black surface is of little use for this purpose, and the form is best calculated to throw out the smoke into the room. The true form for the upper part of the stove is the funnel-shape, with a throttle-valve in it, as Dr. Arnott has applied it, so as to regulate the exit of air, and, consequently, the draught, at will, extracting more or less heat, and consuming more or less fuel.

The conclusion is that, for the purpose of supplying radiant heat with the least waste and the least inconvenience, a fire-brick stove, with a funnel top and throttle-valve, and a pipe from the external air to supply the fuel draught, is the best adapted.

But there seems to be a fallacy in the notion that a large open-topped fire-place must of necessity cause an enormous *waste* of fuel. It is clear that some heat must be *used* in three ways: First to produce draught in the chimney; secondly, to saturate the clothing, furniture, and walls of the room; thirdly, to produce draught for ventilation. If more be used than is necessary, it is wasted. But if the heated air going up the chimney gives up its heat to the brickwork, that heat is available in warming the dwelling, and is not wasted. And it is possible that a rush of air passing up the chimney above the fire, and as it is called "cutting off the draught," may carry very little heat with it. The mode of ascertaining the waste of heat should be by the pyrometer or thermometer at the chimney-*top*.

The mode of building cottage houses with the chimney-stacks in the centre, containing all the flues, is an illustration how heat may be economised which is apparently burned in waste. The chimney-stack in such case becomes as it were a huge German stove.

As with Cutler's so with Dr. Arnott's improved Cutler's stove, there are two advantages—burning the smoke precisely as a candle burns tallow, with the fire above and the fuel below, and the power of turning up the fire and turning it down, as we increase or diminish the consumption of a gas burner. Whether the mechanical action is the best that can be devised, or whether it is liable to get out of order, are other questions, which time will prove. If not, improvements will be made, patented or otherwise, and the patented ones will thrive best, *cæteris paribus*, because individuals will work most earnestly at them.

These stoves will answer best for offices, from their faculty of maintaining a fire in the owner's absence, and from not going out when neglected for hours; but they will answer better when constructed of fire-brick than of iron; and they ought to answer best, on Dr. Arnott's plan of totally excluding the air below, if the box be supplied entirely with coal-dust. How far they will work in kitchens, with an oven on one side and a boiler on the other, is a question, but there are sufficient advantages to induce the hope that the stove will not again be laid in abeyance, as in the time of Cutler, and that it will not be damaged by the injudicious praises of Mr. E. Chadwick, C.B., who seems bent on obliging every one to resort to it by order of the Board of Health, in order to prove his case of "a saving of three millions per annum in the metropolis alone," by the economy of soap and the diminution in the number of clean shirts. Mr. Chadwick's mode of making deductions from the Preston strike closing the smoky factories, leaves out of the account the absence of washing shirts by reason of want of wages to pay for them, and it is to be hoped that no summary legislation by Lord Palmerston will be grafted thereon, or we may have a second fallacy like that of glazed tubular drain-pipes applied, rightly or wrongly, to all possible purposes. If Mr. Chadwick takes up a crotchet he holds to it tenaciously, and if he once publishes the banns of marriage between any stereotyped stoves and a new building act, he will consider it as an official patent of his own, and protect it accordingly. No conceivable nuisance of private patentees can compare with the nuisance of an irresponsible office held by Royal Authority. The private patentee can only work his individual crotchet, the official patentee can proclaim "Thou shalt have none other crotchet but mine." If Mr. Chadwick had his will, we should be all Prussianised,—no individual will would be left. He would be as one of the old Jesuit missionaries amongst the Indian tribes; all the laws would come out of his mouth; "and by the mass 'twould be sore law," from the vexed question of broken tubular pottery. We would rather trust to Dr. Arnott's patent than to Mr. Chadwick's officiality. He thus sums up:

"The success of the old invention, now revived, and simplified, and cheapened, appeared to be so decisive as to leave nothing now to be desired but extensive and practical measures to ensure its adoption."

That is to say, a New Building Act, worked by the Board of Health, with Mr. Chadwick for official referee, and the patterns of all things, and also of some others, hung up in his office for all future time. From all which deliver us, O Parliament!

Let us not be misunderstood, as detracting from the merits of Mr. Chadwick. His genius lies in the agitation of every kind of unnoticed physical filth, and dragging it, *nolens volens*, before the public, in order to get the nuisances abated. He is, moreover, a veritable Cerberus against every species of "Edie Ochiltree," seeking to lead an easy life without labour. He has the nose of noses for ferreting out any simulated distress, and can calculate to a nicety the exact ration justly due to a pauper, that he may neither deteriorate in body nor absorb too much of the public pabulum. He is the very genius of economy in soap and sewage, and could instruct even the "Scotch captain of a Liverpool brig" in sma' savings. Could he realise his beau ideal, the phrase, "How are you off for soap" would fall into desuetude. Such men are needed,

and an invaluable public servant is Mr. Chadwick, as an exponent of existing evil, but there his faculties end. When he leaves the labourers part of clearing away the rubbish, and sets up as master-builder in hollow bricks and drain pipes, and universal stoves, and assumes to read lectures to engineers on the fallacies of their art, of which he, Mr. Chadwick, is the only true exponent, the matter becomes ludicrous, and perseverance in the endeavour to uphold technical failures in support of official dignity becomes a mischief.

The shoemaker to his last, the scavenger to his besom, and Mr. Chadwick, as prosecutor-general of public nuisances, are good and fitting things, but *non constat* that the perception of a bad odour gives the chemical knowledge essential to neutralise it. I am, sir, yours,

COSMOS.

ORNAMENTATION OF METALS.*

SIR,—As a member of the Society of Arts, I cannot allow the subject of the Paper read by Mr. Aitken, "On Ancient and Modern Metal-working," wholly to pass without making a few remarks on one or two points he refers to.

I send you a portion of two prints taken by the process mentioned, viz., by passing through rollers, between metal plates, perforated paper, lace, &c.,† in the year 1835, by Mr. John Smith, then engaged at the establishment of Messrs. De la Rue, of Bunhill-row. The circumstance is, doubtless, in there collection of those gentlemen, but, at the time, the invention was considered to be of no practical use.

Relative to the subject of the ornamentation of metals by the same process, Mr. Aitken says, that ornamentation has been produced by rolls upon which the designs have been cut in relief, or the reverse, as those on copper calico cylindrical printing-rollers. This idea was likewise Mr. John Smith's, who engraved the *same rolls*, and gave them to Mr. R. F. Sturges, of Birmingham, in the year 1843, by whom they were used to a considerable extent. This was what may commonly be called embossing, the same as paper embossing, and could only be used on soft metals, such as Britannia metal, or others of a similar softness. If hard metals had been used, it would have damaged the engraved rolls in a very short period. By this process I would wish it to be understood, that if a person has, say half a dozen machines, or changes of rolls, as the case may be, he would have six patterns, which, for that description of ornamentation, would be quite adequate to meet the requirements of the market. By the process described by Mr. Aitken, the means used are perishable, and limited to certain descriptions of patterns, but by the engraved rolls *any* design, no matter how complicated or difficult of imitation, could be executed with great beauty and elaboration, which could not be the case with the other process.

Enclosed is a piece of Britannia metal ornamented as described. I do not send it as a specimen of what can be done by the process, only as a sample of what has been done in soft metal. These causes led to the taking out of a patent by Mr. John Smith and myself, which will be found in the list of Patents Sealed, in the Journal of the Society for the week ending 16th September, 1853. This patent has for its object the production of *any* design, or ornament, on all *hard metals*, and more particularly on common *tin plates*, a commodity coming within the requirements of the many. You will see that the means used, as described in that specification, are two embossing rolls of suitable power, but the pattern roller, after being engraved, is subjected to the process of hardening—made so hard that I think I should not be out of place in saying it would last for ever. Half a dozen of these rolls, of choice designs, would serve all the requirements of any market in that trade; and when tin is used, sheets of any size would be supplied to the workers of that material, and could be used by them in the ordinary manufacture of their trade. As these sheets, if there was a great demand for them, could be supplied at such a comparatively small cost, there can be no drawback to the adoption of the article, viz., a beautifully engraved appearance even to the edges of a common tin plate. This can be done to the size of (17×12) for the *large* sum of one half-penny, or even less. I will leave the merits of the two inventions to be decided by your more scientific readers. In the one case the means employed are imperishable, and any number of choice patterns can be obtained, and when once obtained, if the requirements of the market demand it, they may be multiplied without trouble by simply passing the sheets of any metal, *soft or hard*, through the rollers. This could not be done in any other way. It is very evident that the only expense is the original outlay, which is a matter that ought not to stand in the way of practicable results, when there is a chance of a return of the same by a public demand for the article.

I send you a specimen of embossed tin; it is not only indented on the surface of the tin, but the iron is fairly worked up, and is capable, without deteriorating the appearance, of being worked up into any practicable shape, such as stamped, spun, and even hammered articles, and the pattern will not be obliterated.

I am, yours, &c.,

W. H. SMITH.

8, Upper Fountain-place, City-road,
February 20th, 1854.

* Mr. W. H. Smith's letter, it will be observed, is dated the 20th of February last. Unfortunately the original letter miscarried, which will account for its not having appeared before.—ED.

† This, I am informed, was the principal object of Mr. R. F. Sturges' patent.

Proceedings of Institutions.

BEDFORD.—The concluding lecture of the session was given on Wednesday last, by Mrs. C. L. Balfour, on "The Uses of Poetry and the Mission of the Poet." At its close, Mr. Coombs, hon. sec., (who, in the absence of the Mayor, was called on to preside,) presented the thanks of the members and of the audience to Mrs. Balfour, for her interesting and useful lecture, remarking that, as one of its results, the important uses of poetry and the high mission of the poet would be better understood and appreciated by those who had that evening had the pleasure of listening to the eloquent lecture.

GATESHEAD.—The first annual meeting of the Washington Chemical Works Reading Institution and Library was held on Friday evening, the 5th inst. Mr. John Glover, vice-president, occupied the chair. From the report which was read by the secretary, Mr. R. Buddle, it appeared that the institution is in a healthy and prosperous condition. The abstract of accounts showed that after the payment of all liabilities, there remained a balance in the hands of the treasurer. The institution now numbers 114 members. The volumes purchased during the last year amount to 160, a very considerable saving having been effected in their purchase, through the medium of the Society of Arts book arrangement. Although the formation of this institution originated with the workmen themselves, the Washington Chemical Company have very kindly seconded their efforts, having built and furnished two neat and commodious rooms for their accomodation. A donation of 10l. has also been received from the President, Isaac Lowthian Bell, Esq. At present twelve newspapers and twenty periodicals are received into the news-rooms weekly, and these are of the most popular and instructive character.

GLASGOW.—The annual distribution of prizes at the Mechanics' Institution took place on Wednesday se'nnight.

The chair was occupied by Mr. James Gourlay, the senior magistrate, supported by others of the civic authorities, and by several of the vice-presidents and officers of the institution. Mr. George Good, the Secretary, read the annual report, which was of a highly favourable character. There had attended the chemistry class 119, the natural philosophy class 84, the music class 80, the mathematical class 82, the practical drawing class 163, and the botany class 129. The reading room of the Institute had fallen off in interest, and it had been discontinued, and the room appropriated to extend the drawing class. After a few observations from the Chairman, the following prizes were awarded: 1. The Birkbeck Testimonial Prize, value 2l. 2s., to M. K. Armstrong, letter-press printer. 2. For the best account of the chemical lectures, 1l. 1s., to J. Smith, engineer. 3. Mechanics' class, 1st prize, 1l. 1s., to R. Anderson, draughtsman; 2nd prize, 15s., to J. M'Intyre, clerk; 4. Theory and practice of music, 1st prize, 15s., to D. Johnston; 2nd prize, 12s. 6d., to R. Rodger and M. K. Armstrong, equal. The committee had appropriated money for prizes in the Mathematical Class, but in consequence of the intimation being made too late, Professor Laing thought that a comparative examination could not then be instituted with justice to the class, and therefore he declined to offer prizes. 5. Mechanical Drawing Class, 1st prize, 12s. 6d., to J. A. Arneil, land surveyor, and D. Wilson, engineer, equal; 2nd prize, 10s. 6d., to J. Thompson, pattern maker; 3rd prize, 8s. 6d., to J. M'Lean; 4th prize., 6s., to J. Bacon. 6. For a model life boat, 2l. to W. Lewis, pattern drawer.

POOLE.—On Wednesday evening, the 3rd inst., H. D. Seymour, Esq., M.P., delivered a highly interesting lecture on behalf of the Mechanics' Institute, to a crowded audience, on the subject of his recent travels in the East, entitled "Southern India in 1853-4." This was a supplementary lecture to the Session, delivered by the honourable gentleman, in pursuance of a promise made by him some time previous to his visit to India, his absence from England having prevented his fulfilling his engagement during the Session.

MEETINGS FOR THE ENSUING WEEK.

MON. Geographical, 1.—Anniversary.
TUES. Royal Inst., 3.—Prof. Tyndall, "On Some Phenomena of Heat, Mine-Gas," &c.
Horticultural, 3.
Meteorological, 7.
Civil Engineers, 8.—Mr. W. M. Peniston, "On the Casualties of Tunneling, with Examples."
Medical and Chirurgical, 8½.
Zoological, 9.
WED. Linnæan, 1.—Anniversary.
Royal Botanic, 2.—Exhibition.
Society of Arts, 8.—Mr. S. W. Leonard, "On the Microscope, as applied to Art, Science, Manufactures and Commerce."
Geological, 8.—1. Continuation of Mr. Westwood's Paper "On Fossil Insects." 2. Mr. Woodward, "On the Rudistes." 3. Mr. Prestwich, "On the London Clay and the Bracklethan Beds."
Archæological Assoc., 8½.
Royal Society of Literature, 8½.
THURS. Royal Inst., 3.—Mr. M. T. Masters, "On Botany."
Numismatic, 7.
Antiquaries, 8.
FRI. Ethnological, 3.—Anniversary.
Architectural Assoc., 8.—Class of Design.
Philological, 8.
Royal Inst., 8½.—Mr. B. C. Brodie, "On Melting Points."
SAT. Royal Inst., 3.—Prof. J. Tyndall, "On the Importance of the Study of Physics as a Branch of Education for all Classes."
Royal Botanic, 3¾.
Medical, 8.

Miscellanea.

PAPER FROM GORSE.—A correspondent of the *Gardeners' Chronicle* suggests that gorse might be used with advantage in manufacturing paper. He is in the habit of using large quantities of crushed gorse as food for his horses. This is well mashed in water with a pestle till all soluble matter is separated "About 50 per cent. of the green gorse appears to be water, and about 25 per cent. soluble matter, in which its feeding properties mainly reside, and 25 per cent. woody fibre. In the process of mashing under water, some of this fibre was lost, but 17 per cent. of the whole weight of the fresh cut gorse was obtained. I find that I cut about 12 tons of gorse per statute acre annually on light and deep, but otherwise poor soil; so that a nett yield of two tons of fibre per acre might be obtained. It would possibly be worth while so to arrange the process as to preserve and use the solution for moistening dry food for sheep and cattle. I do not know what value the paper makers would set on such fibre, but looking to the cost of waste cotton, I should think the value of 2 tons of it per acre ought to pay."

ROYAL GEOGRAPHICAL SOCIETY.—The anniversary meeting of this society, for the election of officers, &c., will be held at Regent-street, on Monday, the 22nd inst., at one o'clock. During the ballot the royal medals "for the encouragement of geographical science and discovery," will be presented to Rear-Admiral W. H. Smyth and Captain R. J. Le McClure, R.N., by the president, the Earl of Ellesmere, who will then deliver his annual address. The dinner will take place at the Freemasons' Tavern.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 11th May, 1854.

Par. Numb.
223. Assistant-surgeons (Navy)—Return.
228. Committee of Selection—11th Report.
230. Assistant-surgeons (Army)—Return.
180. Metroplis Drainage—Return.
86. Bill—Gaming Houses.
Bankruptcy Commission—Report.
Railways (means of Communication between Guards and Drivers)—Captain Wynne's Report.

Delivered on 12th May, 1854.

210. Pauper School Districts—Abstract Return.
233. Apprentices (Merchant Sea Service)—Return.
234. Court of Chancery—Returns.
Borneo—Papers.

Delivered on 13th and 15th May, 1854.

217. Aliens—Return.
231. Brighton Municipal Charter—Captain Warburton's Report.
246. Exchequer Bonds—Account.
96. Unstamped Publications—Return.
212. Business of the House—Report from the Committee.
44. Local Acts (No. 54, Londonderry and Coleraine Railway; No. 52, Ennis and Shannon Navigation)—Reports from the Admiralty.
94. Bills—Church Rates.
95. Bills—Medical Graduates (University of London.)
96. Bills—Customs Duties.
97. Bills—Excise Duties.
City of London Commission—Report.

Delivered on 16th May, 1854.

162. Dungarvan Election—Report from the Committee, with minutes of evidence.
89. Bill—Public Libraries.
City of London Commission—Report, with minutes of evidence.

Delivered on 17th May, 1854.

Argentine Confederation—Treaty for the Free Navigation of the Rivers Parana and Uruguay.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 12th*, 1854.]

Dated 15th December, 1853.

2911. A. B. Callier, Paris—Umbrellas and parasols.

Dated 11th March, 1854.

594. J. J. Aston, Middle Temple—Envelopes.

Dated 24th March, 1854.

695. J. Jeyes, Northampton—Pulp from twitch or couch grass.

Dated 31st March, 1854.

741. A. A. de R. Hely, 13a Cannon row, Westminster—Exhibiting.

Dated 5th April, 1854.

786. G. F. Wilson and J. M. Whiting, Rhode Island, U.S.—Wood screws.

Dated 6th April, 1854.

795. J. E. Boyd, Lewisham—Ships' anchors.

Dated 7th April, 1854.

804. T. Williams, Manchester, and S. Ainley and M. Mills, Oldham—Spinning machinery.

Dated 19th April, 1854.

905. R. A. Brooman, 166, Fleet street—Separating substances. (A communication.)

Dated 21st April, 1854.

923. A. Blavier, Paris—Locomotive engines.

Dated 24th April, 1854.

933. D. Buddo, St. Andrew's, N.B.—Magnetic weather-gauge.
935. M. Poole, Avenue road, Regent's park—Washing garments. (A communication.)
937. W. E. Newton, 66, Chancery lane—Casting type. (A communication.)
939. W. E. Newton, 66, Chancery lane—New material. (A communication.)
940. T. W. Dodds, Rotherham—Prevention of smoke.
941. J. Davidson, Edinburgh—Breakwaters.
942. W. Blackwood, Arthurlie, N.B.—Treatment of yarns.

Dated 25th April, 1854.

943. R. F. Sturges, Birmingham—Joining metals.
945. F. A. T. de Beauregard, Paris—Inks and papers.
946. W. Collier, Weston—Evaporating pans.
947. R. Ellis, and J. W. Martin, St. James's Drying by hot air.
948. J. Aitken, Douglas, N.B.—Sawing machinery.
949. J. Lawson and S. Dear, Leeds—Looms.
950. J. Goucher, Worksop—Propelling.

Dated 27th April, 1854.

951. C. C. Person, Paris—Galvanization.
952. E. Crosland, Rochdale, and T. Boardman, West Roughton—Weaving.
953. T. G. Owen, Dalston—Portable filter.
954. W. Gravatt, Park street, Westminster—Propelling.
956. J. H. Johnson, 47, Lincoln's inn fields—Polishing metal plates. (A communication.)
958. H. Clarke, Lincoln—Fire-arms and ordnance.
959. R. Green, 12, Sidney street, Brompton—Propelling.
960. J. Barling, Maidstone—Paper from hop bine.
961. F. Woodbridge, 3, Green's terrace, Rotherhithe—Furnaces.

Dated 28th April, 1854.

962. A. W. Gibson, Edinburgh—Barley and rice mills.
963. W. L. Tizard, Aldgate—Calcining metals and roasting vegetable substances.
964. J. Evans, Abbots Langley—Paper.
965. J. Heywood, Ratcliffe bridge—Printing yarns.

Dated 29th April, 1854.

966. A. M. Dix, Salford—Gas regulator.
967. B. Dixon, Birmingham—Measuring rules.
968. J. P. Varlet, Paris—Obstructing shot or other holes in ships.

WEEKLY LIST OF PATENTS SEALED.

Sealed May 12th, 1854.

2627. William Austin, of 27, Holywell street, Westminster—Improvements in the manufacture of casks.
2629. William Austin, of 27, Holywell street, Westminster—Improvements in apparatus for trapping passages into sewers or drains.
2634. Henry Willis, of Manchester street—Improvements in the construction of organs and free reed instruments.
2642. John Josias Catterson, of Islington—Improvements in carriage springs.
2882. Edward Green, of Wakefield—Improvements in boilers and furnaces.
233. Thomas Hollingsworth, of Nottingham—Improvements in forming or applying tags to laces.
279. James Boydell, of Anchor Iron Works, Smethwick, near Birmingham—Improvement in the beds of reverberatory furnaces used for puddling iron.
483. William Simpson, of Tovil Upper Mills, near Maidstone—Improvement in employing (in the manufacture of soap) a product obtained when manufacturing pulp from straw.
529. Felix Abate, of 21, George street, Hampstead road—Improvements in printing on and ornamenting surfaces.
563. George Thomas Selby, of Smethwick—Improvements in machinery for the manufacture of tubes and pipes, and for shaping tubular and circular metal articles.
585. George Appolt, of Sulzbach, and Charles Appolt, of Metz—Improvements in the manufacture of coke.

Sealed May 16th, 1854.

2656. David Pratt, of Birmingham—Certain mechanical arrangements for raising thimbles; the same to be worked by steam, water, or other power, thereby superseding hand labour.
2657. John Ferguson, of Heathfield, N.B.—Improvements in furnaces and fire-places, and in the prevention of smoke.
2661. George Carter, of Mottingham—Improvements in the construction of steam-engine boiler and other furnaces.
2666. John Banfield, of Birmingham—A double acting railway signal for preventing collisions or accidents on railways.
2669. Thomas Bourne, of West Smithfield—Improvements in the construction of buckles.
2681. Jean Baptiste Clavières, of Paris—Improved mode of giving publicity.
2691. William Austin, of 27, Holywell street, Westminister—Improvements in the manufacture of tiles and tubes.
2712. Robert Adams, of King William street, City—Improvements in fire-arms.
2729. John Drumgoole Brady, of Cambridge terrace—Improved mode of, or a new arrangement of, straps for slinging knapsacks.
2796. Joseph Dilworth, of Preston—Improvements in escape valves and safety-valves.
2798. John Henry Johnson, of 47, Lincoln's inn fields—Improvement in the treatment or manufacture of caoutchouc. (A communication.)
2837. Julian Bernard, of 15, Regent street—Improvements in machinery or apparatus for stitching or uniting and ornamenting various materials.
17. Julian Bernard, of 15, Regent street—Improvements in the manufacture of boots and shoes; part of such improvements being applicable to the manufacture of garments.
33. John Healey, of Bolton-le-Moors—Improvements in spinning machines known as mules, and in machines of similar character. (A communication.)
62. Ambroise Auguste Masson, of Paris—Improvements in the manufacture of thread or wire to be used for making gold or silver lace.
102. George Fergusson Wilson, of Belmont, Vauxhall—Improvements in treating castor oil and obtaining products therefrom.
183. John Bird, Kingswinford—Improvements in kilns for burning bricks and other articles.
236. Isaac Hazlehurst, of Ulverstone—Improvements in the manufacture of iron by blast, and in the construction of furnaces and machinery for the same.
326. James Young, of Glasgow—Improvements in gas making.
442. William Ryder, and James Ryder, both of Bolton-le-Moors—Improved composition applicable to coating metals.
489. John Thomas Way, of Holles street, Cavendish square, and John Manwaring Paine, of Farnham—Improvement in the manufacture of gas, and also of a charred product.
511. Andrew Barclay, of Kilmarnock—Improvements in arranging and working mining engines and machinery.
523. Joseph Bour, of the Mauritius—Improvements in evaporating saccharine liquids.
530. Herman Dirs Mertens, of Margate—Improvements in working steam-engine valves.
590. Willoughby Theobald Monzani, of St. James's terrace, Bermondsey—Improvements in bedsteads, and packing cases or boxes to contain the same and other articles.
637. Rice Williams Harris, and Thomas Patstone, both of Birmingham—Improvement or improvements in shades or glasses for gas and other lamps.
696. William Wood, of Monkhill House, near Pontefract—Improvements in machinery or apparatus for the manufacture of carpets and other fabrics.
700. Walter Neilson, of Glasgow—Improvements in marine steam machinery.

Sealed 17th May, 1854.

2665. William Ashton, of Manchester—Certain improvements in machinery or apparatus for manufacturing braid.
2670. Augustus Johann Hoffstaedt, of Albion place, Surrey—Improved mode of preparing the colour known as artificial ultramarine.
2684. John Harcourt Brown, of Arthur's seat—Improvement in the manufacture of artificial skins.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
May 12.	3592	The *Tout à Fait* Travelling Bag or Portmanteau	George Langford Williams	41, New Bond Street.
,, 15.	3593	Improved Kitchen Range, or Economical Cooking Apparatus	George John Calvert.........	York.

Journal of the Society of Arts.

FRIDAY, MAY 26, 1854.

MEETING OF COUNCIL.

WEDNESDAY, MAY 24, 1854.

The attention of the Council having been called to certain passages reflecting on Edwin Chadwick, Esq., C.B., which appeared in the last number of the Society's Journal, it was

Resolved unanimously—"That the Council regrets that those passages, in the hurry of business in the Secretary's office, were inadvertently admitted into the Society's Journal, and considers that personal reflections are altogether unsuited to its pages."

Resolved—"That the foregoing resolution be communicated to Mr. Chadwick, and be published in the next Journal."

EDUCATIONAL EXHIBITION.

The Council has deputed Mr. Winkworth to visit Holland and Belgium, with a view to procure those countries to be adequately represented in the Educational Exhibition. Mr. Winkworth reports to the Council that he has received valuable assistance from Sir Ralph Abercromby, H.B.M. Minister at the Hague, and that the government in Holland has given directions to the principal educational establishments at Gröningen and elsewhere in that country, requiring an immediate selection of articles to be made, together with school statistics, and has ordered them to be sent to London without delay. Mr. Winkworth has taken the opportunity of visiting several educational establishments at the Hague, and reports as follows:—

I visited in company with Mr. Van de Kasteele

1. The Armhuis, a school kept at the expense of the town, for orphan children, of which there are now in it 180, or about 90 of each sex. They are admitted at the age of 5 or 6 years, and remain until they are 13, during which time they are boarded, clothed, and educated.

The education does not go much beyond reading, writing, and arithmetic, but these are taught completely, so that they are fit for any situation or business not requiring superior qualifications. When placed out they are not lost sight of, but, if necessary, are clothed and boarded until they are able entirely to support themselves.

The girls are taught needle-work and knitting, the proceeds of which go to the support of the establishment. One of the children was knitting some fine laced stockings for one of the young princes, and nothing could be more delicate of its kind.

The neatness and simplicity of the beds, bedsteads of iron, and of the dormitories generally, are deserving of all commendation.

As for the arrangements of the school-rooms, desks, &c. I did not find any appreciable difference from those adopted in our own country.

There are, however, some appliances for teaching spelling and arithmetic, and I have ordered one of each to be made for the Exhibition.

The schoolmaster has promised to send me some specimens of writing of children of different ages, which I will bring with me to England.

2. The private establishment of Mons. G. A. Burnier.

Although schools of this sort are not within the scope of my instructions, I thought it right to avail myself of an opportunity of visiting it, Mons. Van de Kasteele having one of his sons there.

It is calculated, in construction and accommodation, for the education of about 300 children, a portion only of whom are boarded and lodged.

The education imparted is of the highest order, and includes lectures, illustrated by diagrams and experiments, but I did not observe anything sufficiently original for special notice.

3. The Stadschool. This establishment is entirely supported by the town, under the control of the magistrates. It is free to all children whose parents or friends cannot afford to pay for their education, and as these are very numerous, and it is imperative that all children should be educated, there are at this moment not less than 1000 under tuition. As at the Armhuis, the instruction given is in a great degree confined to the three primary elements, but these are thoroughly taught. Children are admitted at 9 years of age, and may remain about three years. I entered the school after the dinner hour, at two o'clock, and as soon as the children had taken their seats, a little girl was called upon to read a short prayer, which she did with great propriety, and amidst the most profound silence. Indeed I may here notice that, except under certain circumstances, the quietness and attention that prevailed, both here and at the other schools I visited, were very remarkable.

Both boys and girls are taught in the same rooms, but sitting at different desks or tables in the same classes; 700 were in one room and 300 in another. There are one head master and twelve assistants, one only of whom is a female, and all of whom have been brought up at the school. They consider young men as the best teachers of both sexes, and I did not see anything to make me doubt the propriety of the practice.

Prints on rather a large scale are also introduced where it appears necessary to allure, as it were, very young children into attention. Music (vocal) is taught in all schools, as with us, and several short pieces were sung in parts, with considerable taste and execution.

Writing is taught in the usual way, and I shall have specimens to bring with me to London, where the children are sufficiently advanced; spelling is learned from dictation of the master out of some book, care being taken that it shall also be otherwise instructive.

The punishments are generally confinement and lessons during play hours, but one of them is certainly original, and is only administered to great transgressors. The culprit is required to follow the master wherever he goes for a whole day, and so painful is the infliction, from the gibes he has to endure from the whole school during his walks, that not more than one or two such exposures are made during the year. The measures taken to make the children enter into and understand what they are learning and to ensure cleanliness, neatness, and punctuality, are equally effective, but I need not explain them in detail, or enter into the economical or other arrangements by which these schools, established in every town, are rendered so exemplary and effective.

I must, however, add that the masters in the various schools I visited take great pains to make their pupils have an interest in and fully understand what they are learning. It is, therefore, intellectual, and not merely mechanical education which is imparted.

The following copy of a despatch has been received from the Foreign Office:—

"Berne, May, 10th, 1854.

"MY LORD,—With reference to your Lordship's despatch No. 2, dated the 11th February, to Mr. Christie, then in charge of this mission, and to the note which in accordance with his instructions he addressed to the Federal Council on the subject of the Educational Exhibition to be held in London this year, I have the honour to inform your Lordship that I have received an answer from the Federal Counc

in which they state that seven of the Swiss cantons have responded to the invitation, three cantons have declined, fifteen have as yet sent no answer.

"The Federal Council wish to be honoured with your Lordship's advice as to whether the objects to be exhibited by the seven cantons may be immediately transmitted to England, or whether it would be preferable to wait until the other fifteen cantons shall have decided as to their co-operation in the Exhibition. The Federal Council also wish to know whether her Majesty's Government will give the necessary instructions to the Custom-house in order that the articles for Exhibition may be admitted free of duty.

"I have, &c.,
"(Signed,) CHARLES A. MURRAY."

A letter has being received from M. Pullicino, Chief Director of Primary Education in the island of Malta, advising the shipment of a case containing objects contributed by the Government Primary Schools of that island to the Educational Exhibition. M. Pullicino adds that he intends shortly to send over documents relating to the subject of education there. The case has arrived at Southampton.

The Council of the Society of Arts solicits attention to the intended Educational Exhibition at St. Martin's Hall, in June next.

To give full development to this undertaking, to procure the co-operation, not only of the great Educational Societies and Institutions at home, but also in the Colonies and the Continental States, and to illustrate it by Lectures, with practical discussions, a considerable outlay must be incurred.

The Council deems it a duty to secure the funds of the Society from an expenditure which would interfere with its ordinary proceedings, and therefore invites the co-operation of the Members of the Society and of other friends of Education.

The following subscriptions have been already received:

	£.	s.	d.
H.R.H. Prince Albert, President	100	0	0
Amount of subscriptions already published	570	8	0
THIRD LIST.			
Lord Ashburton	25	0	0
Beriah Botfield	2	0	0
William Brown, M.P.	10	0	0
W. Charley	1	1	0
Baron Goldsmid	20	0	0
Jabez James	2	2	0
W. S. Pryor	2	2	0
Bishop of St. Asaph	10	0	0
Dean of Salisbury	3	3	0
G. F. White	2	2	0
Henry Whitfield	0	10	0

TWENTY-THIRD ORDINARY MEETING.

Wednesday, May 24, 1854.

The Twenty-third Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 24th instant, Harry Chester, Esq., in the chair.

The following candidates were balloted for and duly elected Ordinary Members:—

Bullen, Edward, A.M.
Farr, William, M.D.
Morley, Samuel
Latham, Robert Gordon, M.D., F.R.S.

The following Institutions have been taken into Union since the last announcement:—

359. Andover, Hants and Wilts Educational Institution.
360. Linton (Cambridgeshire) Literary Institution.
361. Repton, Institute.

The Secretary called attention to a model of a plan for the consumption of smoke, the invention of Mr. Witty. The bridge at the end of the fire bars is perforated, and there is a space above which may be either closed or opened, by means of a slide worked by a lever passing through the ashpit to the front of the furnace. Behind the bridge there is a space for the admission of heated air. When the furnace is fed with fresh fuel the space above the bridge must be closed by raising the slide. The smoke and other gaseous products evolved within the furnace from the fresh fuel will be immediately arrested in their attempted passage through the perforated bridge, and burnt and turned into flame. After all the smoke from each supply of fresh fuel has been given off, the slide should be lowered, when it will be found that the admission of heated air behind the bridge will be shut off, and that the combustion within the furnace will be sustained by the usual and ordinary means. The invention may be applied to any furnace in a few hours, and it is estimated by the patentee that a saving in fuel of from 30 to 40 per cent will be effected by its use. The Secretary also described a Machine for Engraving by means of Electro-Magnetism, the invention of Mr. William Hansen, of Gotha. A full account of this machine, with illustrations engraved by it, will appear in the next number of this Journal.

The Paper read was

ON THE MICROSCOPE,

As Applied to Art, Science, Manufactures, and Commerce.

By S. W. Leonard, F.M.S.

There are, no doubt, many persons here present who are already too well acquainted with the subject now brought before you to admit of a hope that much of what I have to offer can be new or interesting. I must, therefore, beg the indulgence of those persons, if I address myself more particularly to those who may not yet have become familiar with the microscope and its marvellous revelations. I will not occupy the time with any description of the instrument itself, or its late rapid advancement towards perfection and importance. That has been so ably done in a work already published, that it would be superfluous to do more than refer you to "The Practical Treatise on the Use of the Microscope," by Professor Quekett; to whose kindness and friendly assistance I have, through a series of years, been indebted for a great part of my microscopical experience. It may suffice to observe that the microscope has now attained a position but little, if anything, inferior to the magnificent telescope, which has made us acquainted with the wonders of the starry heavens in a degree that in former times was never dreamed of! If the "eye-invigorating" tube which reveals to mortal sight the countless worlds that swarm in the immeasurable fields of infinite space, and which, to our amazement, converts a small, faint patch of hazy light beyond the stars into an "Island Universe," containing millions of brilliant suns, whose collective light can only reach us after an inconceivably swift journey of many thousands of years; if these discoveries have given to

the science of astronomy a sublimity which no human mind can grasp, which none but the Great Creator of all things can fully understand, the microscope, on the other hand, has opened to us a new and inexhaustible field of wonder and research; displaying to our astonished gaze another world of objects, of exquisite formation and surpassing beauty; so minute that, without the powerful aid of optical science, we must for ever have remained unconscious of their existence. Happily that science has reached a high degree of perfection. More especially has it done so since the removal of that fiscal incubus which so long sat upon the bosom of genius and industrial enterprise, stifling every attempt at improvement. Gratifying, indeed, must be the feelings of those opticians who have succeeded, by their untiring energy and application, in arriving at such splendid results. Independently of pecuniary considerations, theirs is the proud reward that they bequeath to posterity the means of exploring nature, not only in her greatest magnitudes, but in her most minute and delicate productions. Nor is this all; the microscope has now become a valuable adjunct of science and art, manufactures and commerce; and to its connexion with these my observations will principally be confined this evening.

In the healing art, a bare enumeration of the uses of the microscope would lead us far beyond the limited time, and indeed none but a medical professor could do justice to that part of the subject. As an educational instrument, in the various departments of medical science, the microscope has become indispensable. Mr. Guthrie, in one of his lectures, says, "Microscopic observation has unfolded much of the ultimate structure of parts which was formerly unknown, or at most only suspected." "The microscope, in the hands of Mr. Quekett, discloses the nature of the diseased as well as the healthy structure of parts. The secretion from a diseased part will often show the nature of the disease itself, nd enable the surgeon to judge whether an operation may or may not be performed with a reasonable hope of success; and whether it is necessary to do it or not." To the physiologist, the microscope reveals the minute structure of animal and vegetable tissues, (many of them exceedingly beautiful,) showing also the remarkable similarity that exists between animal and vegetable forms in the early stages of cellular development.

I shall have occasion, before I conclude, to return to this part of the subject, in order to illustrate some very important discoveries which the microscope has been the means of bringing to light. The comparative anatomist unerringly determines, by its aid, to what kind of animal a tooth, or fragment of bone, found in any of the strata of the earth's crust belongs, whether beast, bird, reptile, or fish; and, in many cases, even what species it belongs to; the bones and teeth of each order having a distinctive character. On the table are some magnified drawings of the structure of bone in the four classes of vertebrate animals; to insure correctness they were done with the aid of the *Camera Lucida*; and, for the purpose of comparison, are all drawn to the same scale. The varieties of form, size, and arrangement of the bone-cells, the canaliculi, and haversian canals in the different classes are very curious.

To the geologist, the microscope discovers the astounding fact that in many parts of the world, miles of strata of great thickness are almost entirely composed of the skeletons and shells of minute animals, in the formation of which, and in the covering them up with overlying strata, countless ages must have been occupied. Shells, corals, madrepores, form the entire mass of many rocks; and the same enormous extent of minute masonry is going on to this day! By the aid of the microscope, the naturalist, as with the wand of a magician, calls up multitudes of minute vegetable and animal races, inhabiting the earth, the air, and the water, even to the depths of the ocean; from the snow-clad polar regions to the burning deserts of the torrid zone, and which, have never yielded up to any other power that man is possessed of the long preserved secret of their hidden existence. Of these there are two families, now claimed by botanists. Those called *Desmidieæ*, inhabit the fresh waters, and have a horny skeleton; the others, called *Diatomaceæ*, are principally marine, and their skeleton is composed of silica. The question between learned disputants, as to whether these minute beings are really of vegetable or animal production, seems to be yet scarcely settled. Zoologists and botanists both claim them. It appears, however, that at present the botanists have got the best of the day. Possibly these paradoxical beings may constitute one of those links in the chain with which nature, at first sight, appears to be puzzling her students, who, after all their toil and research, sometimes come at last to one great truth, namely, that they really know very little of the matter. These microscopic vegetables then, "if such they shall ultimately be allowed to remain," exist in such numbers, that (quoting the writer of an essay on the microscope, published in Chamber's Papers), "they form extensive rocky strata, chains of hills, beds of marl; almost every description of soil, whether superficial or raised from a great depth, contains the remains of these little plants, in greater or less abundance. Some great tracts of country are literally built up of their skeletons; and in some they constitute the leading features in the structure of the soil." "The world is a vast catacomb of Diatomaceæ." Do not these form far more durable monuments of past existence than the gigantic and laboriously sculptured records of the most renowned kingdoms of antiquity? of whose inscriptions the characters now convey to us no information—their meaning is lost—forgotten as the hand that chiselled them; while those of the minute *Diatomaceæ* are still legible; their type is the same now as in the thousands of ages that belong to the past eternity. The recent, or living tribes, have the same character, wear the same forms, and carry on the same manufacture as their long-buried ancestors. It appears that Dr. Hooker describes "the waters and even the ice of the whole Antarctic Ocean, between the parallel of 60° and 80° South, as abounding in them in such countless myriads, that they everywhere stain the surface of a pale ochorous brown colour, and they are gradually producing a submarine deposit or bank of vast dimensions, which flanks the whole length of Victoria barrier (a glacier of ice some 400 miles in length), and the deposit occupies an area 400 miles long by 120 miles broad. All the soundings over this deposit—and the lead sometimes sunk two feet in it—brought up scarcely any thing but Diatomaceæ! Not only are these wonderful creatures —which, by the way, are very much unlike plants—constantly accumulating in beds at the bottom of the ocean, and in lakes and ponds, but they travel through the air. They have been found floating in the atmosphere of the tropical Atlantic. Darwin, during the voyage of the Beagle, collected an impalpable dust which fell on the ship when to the west of the Cape de Verd Islands. On examination with the microscope, it was found to consist of the skeletons of Diatomaceæ. These remains are supposed to have been ejected from some volcano then in activity; as their siliceous skeletons resist the action of fire, and form constituents of the pumice and ashes ejected from the burning crater."

Returning to the crust of the earth, we may suppose ourselves in company with the geologist and the natural ist, exploring our own country, and we find that the white cliffs of England, round a great extent of the southern and eastern coasts, are composed of chalk, which runs far inland through many counties; and our microscope tells us that this chalk is composed of shells and corals. The waters which sweep round Margate, Ramsgate, and Dover, are whitened with the remains of shells and corals. Manufactured into whiting, our ceilings are washed with them, and—but perhaps it was only a satirical squib which asserts that these shells and corals come to us in our London milk. Certainly we take them sometimes in our doctor's physic; and, we have heard, that the confectioner

is by no means niggardly of them in his comfits and sugar-plums.

Two other tribes of minute beings are less equivocal. I allude, first to the numerous species of fungi, whose sporules are some of them so fine that they can only be distinguished under the microscope as resembling a thin smoke. These fungi float about everywhere and in everything, and are ready to burst into life wherever they find a suitable matrix to plant themselves upon. Some of them are luminous. The Rhizo morpha is a phosphorescent kind, which lights up certain mines, giving them the appearance of an enchanted palace, illuminated and studded with gems. Secondly, the equally multitudinous families called Polygastrica (or many-stomached) and Rotifera, so named from their apparently rotatory motion when seen under the microscope. These I shall have to notice further, when speaking of ciliary movement.

Of the application of the microscope to the recently discovered art of Photography, I regret that I am not yet prepared to lay any specimens before you. I believe that, eventually, means will be found to produce excellence in this way. The beautiful and ingenious though complicated apparatus introduced to this Society for the purpose, in May last year, by the Rev. Towler Kingsley,* showed that it can be done, although the expensive nature of it may retard its general adoption.

In commerce the microscope lends its powerful aid for the detection of fraud by the adulteration of numerous articles, both as imported from foreign countries for consumption here, and as adulterated by the dealers in them at home. It is said to be a matter of extreme difficulty to procure really genuine drugs of many kinds from abroad. If the merchant would supply himself with a microscope, he would find his interest in the study of it. Once acquainted with the microscopical appearance of the genuine article, he would immediately detect any imposition that might be attempted, before purchasing and shipping goods for importation. In agriculture, if the hard hand of the farmer can be trained to the manipulation of so delicate an instrument as the microscope, and his head to appreciate the utility of it, he may frequently discover the causes of failure in many of his crops, and in future try to provide remedies for some of the more destructive of them. He would become acquainted with the nature of many diseases that attack and blight his corn and other crops, and of which there are hundreds of farmers who know nothing more than the mere common names, such as rust, mildew, smut, ear-cokle, bunt, ergot, wheat-midge, &c. Time will not here permit further notice of these, but I would strongly recommend to all who are concerned in agricultural pursuits (especially to those farmers who are opposed to the improvements of such men as Mr. Mechi), an attentive perusal of a little treatise entitled, "Blights of the Wheat and their Remedies." This work is edited by a very scientific gentleman, the Rev. Edwin Sydney, and is published by the Religious Tract Society, in St. Paul's Church-yard. I consider it the cheapest and best six-pennyworth of very valuable information on this particular subject that I ever met with. By means of the microscope both the merchant and the farmer may be guided in their purchase of guano as a manure. Perhaps no article of commerce has been more constantly adulterated than this. In a paper read before the Microscopical Society, in January, 1854, by Mr. Edwin Quekett, he said:—"The proportion of the crystalline to the brown amorphous particles is subject to much variety, insomuch so that it is quite possible to distinguish the Ichaboe guano from the Peruvian, by the former having so many more bundles as well as single crystals than the latter." "Though the microscope cannot determine accurately the value of the different samples for the agriculturist, it is quite capable of showing when the guano has been adulterated by foreign matter, from the different appearance it presents, as also in the proportion of the crystalline to the earthy particles. The peculiar nodulated character the latter exhibit could not be imitated by sand or other impurities. When viewed as a transparent object, moistened with water and under a higher power, we can readily see that guano is composed of organised, crystalline, and mineral matters. The organized appear to be dried flesh, apparently that of birds or fish; and very minute fragments of shells, and abundance of spicules of sponge of two or three kinds, and very many specimens of Actinocyclus, Gallionella, and Coscinodiscus, especially in that from Ichaboe. The crystalline appear to be various salts, well known to constitute the most valuable portions of the manure. The mineral appear to be sand. Mr. Warington has examined the crystallized part, and finds it to be composed of sulphate of potash and ammonia."

It is a lamentable fact that very many substances used for food are constantly liable to adulteration from the fraudulent tricks of dishonest dealers, and thus whole families have their health injured by the unwholesome and even poisonous ingredients that are mixed up with articles of daily consumption.

The microscope has done much to abate this evil, or at least, to expose it, but, while such a thing as dishonesty exists in the world, even the powerful alliance of this instrument with chemistry may not entirely overcome this species of fraud, in which every artifice is employed to cheat the public and rob the poor. I regret that only a brief outline of some of these frauds can here be given.

First then, our tea, coffee, sugar, milk, and bread. The black tea, is frequently adulterated with other leaves than those of tea, and by the re-preparation of exhausted leaves with substances for imparting colour and astringency, or to glaze and face the surface of dried leaves.

The Chinese annually dry many millions of pounds of leaves of different plants, to mingle with the genuine, as those of the ash, plum, &c. We are worse off now than formerly, for while the trade was in the hands of the East India Company, few of these were shipped for London, as the Company's inspectors usually detected the imposition; but since the trade has been thrown open, all kinds find a ready market. The demand often exceeding the supply, the spuriously manufactured article is furnished to the rival crews.

The leaves of many British plants are used for adulterating tea. Those that have been detected are: the beech, horse-chesnut, plane, fancy oak, willow, poplar, hawthorn, and sloe. These leaves are dried and broken into small pieces, usually mixed with a paste composed of gum and catechu (Japan earth), afterwards coloured with rose pink, and mixed either with the dust of genuine tea, or with inferior kinds of black tea. In the year 1843, there were many cases of re-dried tea, for which the parties were prosecuted. It was supposed that there were 8 manufactories in London alone, and several in various parts of the country. Persons were employed to buy up the tea-leaves at hotels, coffee-houses, and other places, at 2d. and 3d. per pound. These were taken to the factories, mixed with a solution of gum, re-dried, and, if for black tea, mixed with rose pink and black lead, to face them, as it termed by the trade. The substances used to renew exhausted leaves are gum, in this country; rice starch, in China; catechu (Japan earth), turmeric, Dutch pink, rose pink, sulphate of iron, logwood, Prussian blue, indigo, powdered mica, French chalk, common chalk, plaster of Paris, china clay, sand stone, and black lead. The Chinese in the neighbourhood of Canton prepare a tea which can be coloured and made up to imitate various qualities of green tea. Large quantities of this are annually made up. Even the coarsest black tea leaves are cut up and coloured with a preparation resembling the hue of green tea. The method adopted by these honest Chinese, the gentleman who saw the operation performed tells us is this. "Damaged black tea leaves are put into a cast-iron pan, placed on a furnace; a small quantity of turmeric powder being previously introduced, they are stirred

* Vide "Journal of the Society of Arts," Vol. 1, page 289.

rapidly with the hand; this gives them a yellowish or orange tint; they are now to be made green; to effect this, some lumps of fine blue, together with a substance in powder, which we ascertained to be prussian blue and gypsum, are triturated together in a mortar, in such proportion as to reduce the colour of the blue to a light shade. A small quantity of this powder is added to the yellowish leaves, which are stirred, as before, over a fire till the tea has taken the fine bloom colour of young Hyson!" The substance before mentioned, called catechu, (which is the *Terra Japonica*, or Japan earth), consists principally of tannin. It is had recourse to when exhausted tea leaves are used, or when other leaves than those of tea are employed. It imparts astringency and colour to the infusion of such leaves, supplying the place of the tannin which has been abstracted from exhausted tea leaves, and of which some of the other leaves are deficient. The leaves of the sloe are astringent, and contain a considerable quantity of tannin. It is on this account that they are so frequently employed.

We shall now see what our coffee is made of. The structure of coffee is different from that of chicory, or of horse-beans, as may be seen in the microscopical drawings on the table. The raw berry is hard after soaking in water, and even after roasting. Other substances used as adulterations become soft in cold water, and may thus be easily detected. Besides the difference of structure under the microscope, coffee contains globules of essential oil, which chicory does not. The adulterations of coffee are various. Some samples which have been analysed give roasted corn; one roasted beans and chicory one-third; another contained one-half coffee, the rest chicory. That sold as "Parisian Coffee" was found to be principally chicory and corn, with very little coffee. Another, puffed as "delicious family coffee," was ¼ coffee, ¾ chicory! The greatest puffers are often the greatest adulterators: one dealer who sold what he placarded as "patent dessicated coffee," cautioned his customers and the public against the unjust and iniquitous system of many grocers in adulterating their coffee with roasted beans, dog-biscuit, chicory, and tan. He advises customers to buy their coffee in the berry, and grind it themselves, and, if they cannot do that, to purchase it of respectable men only, pay a fair and honourable price for it, and then they may depend on a good and genuine article. Now, this man's coffee was adulterated with a very large quantity of chicory. But it would seem that the public had been so gulled, and their taste so misled (perhaps vitiated) by the chicory flavour, so advantageous to the grocer, that the most false and impudent puffs were resorted to to keep up the deception: that when it became no longer lawful to sell chicory mixed with coffee, the discerning public cried out to their grocers, "what is the matter with your coffee? We cannot drink it,—it is horrible." And now that grocers are obliged to sell their chicory separate from coffee, the chicory itself is adulterated with roasted corn, and an ash, of a fawn colour, or light, or dark brown, or the raspings of burnt crust of bread pulverized. But although chicory may no longer profane our coffee except it be with our own consent, other articles, I believe, are not prohibited, and we are not more secure from roasted beans, dog-biscuit, tan, and other delectable matters than before. The best way will be, therefore, to take the "respectable dessicated coffee" vendors' advice, buy your coffee in the berry, not in canisters, nor too dark, as that is probably roasted with sugar. I knew a dealer in a provincial town who used to puff his "black coffee" as a very superior article. It bore a beautiful glossy black colour, which was effected by putting a certain quantity of powdered lump sugar into the roaster with it. There may not be any objection to this on the score of health, but it was an imposition, inasmuch as a high price was charged for that coffee.

Having examined our tea and coffee, it may occur to us that they require a little sweetening; sugar, then, is the next article we have to consider. Of sugar there are two kinds, the first is made from sugar-cane, beet-root, and maple. An inferior kind is produced from grapes and figs. Nearly all brown sugars contain many impurities. One of the most abundant and the most disgusting is the sugar insect (*acarus sacchari*); this is the animal which causes the disease called "the grocers' itch." Persons who have to handle brown sugar much are subject to it. Other impurities are, fungi—starch—woody fibre—lime—lead—iron (a trace), and particles of stone, or grit. In one drachm of brown sugar, which was analysed, there were numerous fragments of cane, and starch granules, pieces of starch, the granules being agglutinated, particles of woody-fibre, 10 or 12 acari, some alive, grape-sugar, vegetable albumen, and lime.

Many samples of sugar which have been examined, were adulterated with flour. This is commonly done to render the coarse dark sugars of a lighter colour; these may contain, not only there own sugar insect, but the *acarus farinæ*, the flour insect. Many brown sugars are adulterated with arrow-roots of various kinds, as the West Indian—Tacca arrow-root from the South Sea Islands—tapioca—potato arrow-root, called "British"—Arum arrow-root, prepared in Portland Island, and called Portland Island arrow-root; also with potato flour, and sago-meal. Pure sugar has a highly crystalline texture, and the large-grained and white sugars are the best; the insect before mentioned is not found in lump sugar, nor in sugar candy. "The worst lump sugar is infinitely better than the best brown sugar that can be obtained." In short it is stated by the Analytical Sanatory Commissioners that the brown sugars of commerce are, in general, in a state wholly unfit for human consumption!

Having sweetened our tea and coffee we require a little London milk.

The appearance of pure healthy milk under the microscope is very beautiful. The semi-opaque, but yet bright appearance of the oily particles, the butter of the milk—and their perfectly spherical form, from the largest globules to the very smallest, without the least cloudiness in any part of the field, are characteristics of pure and healthy milk; the richest and most healthy having, of course, the largest globules, and the greatest number of them. If any other appearances than those I have described should be perceived, there will certainly be adulteration of some kind. On the table are some microscopic drawings of pure, and adulterated milk. In France the microscope has been applied to the examination of milk in the selection of wet nurses. From the report of M. Duvergie, it appears that there is great variety in the nutritive properties of the milk of different nurses; and this mode of selection may, in special cases, and under the inspection of a medical attendant, be a point of very great importance. Some years ago, there was a great excitement in Paris respecting the adulteration of milk, which arose from a report that the milk manufacturers had adopted a new mode of producing artificial milk, and, without abandoning the aid of the "cow with the iron tail," they improved the produce of the said cow by the addition of a certain quantity of the brains of the calf or sheep (perhaps both). The *modus operandi* was, to put the aforesaid brains into warm water, and, by manipulation, coax them to form an intimate acquaintance with the iron-tailed cow's milk (*alias* water). That being accomplished, the mixture would pass very sociably through the meshes of a fine sieve, rejecting and leaving behind those unmanageable portions whose coarse indiscretion might betray the whole secret. The next process was to divest the pure milk of its beautiful yellow coat, called cream, at the loss of which the poor milk looks rather blue. To make the *amende honorable* for this, the manufacturer gently introduces the intellectual treat of brains to the melancholy skimmed milk, and, in appearance at least, it is all right again. Away he goes to his innocent customers, who, in answer to his "milk below, pretty maids" meet him with smiles, and sip the morning beverage before it reaches the breakfast table, no doubt

to test and approve its genuine flavour. A certain stringiness, however, will sometimes appear from the milk jug, and float upon each cup of tea, or coffee, as the case may be; and the good people, amusing themselves with the news of the morning, cast a passing glance at the ropey appearance of the fluid, and, fancying it richness of quality, the mixture is swallowed with gusto. Various other modes of improving the milk are said to be adopted by *artists* in that particular way; but with respect to London, the writer in the *Lancet* gives us comparative comfort, for it is stated that in 26 samples of milk that were examined, none were found to contain any thing but the admixture of water, the quantity of which may be ascertained by the lactometer, and it was proved that of these samples, two or three were genuine: in the others the quantity of water varied from one pint to nearly two quarts in a gallon of milk.

What the contents of the London water are, with which the water companies supply us, the microscope has shown to be by no means calculated to improve or purify our milk. Two eminent medical men, Dr. Lankester and Dr. Hassell, have analysed the water supplied by the several companies, and published the results of their labours, which amply show the necessity that exists for some purer source of supply. The Artesian wells which supply the fountains in Trafalgar-square tell us that there is abundance of pure water under our feet, but the blessing is denied to us, and we are compelled to pay a high rate for a sadly impure article. Our cisterns are full of animal life; of course there must be something in the water for those animals to live upon. We daily boil down millions of animals, and much filthy matter in our tea-kettles and cookery, because the "vested interests," as they are called, of selfish monopolists must not be interfered with! But for this, we might have a series of Artesian wells from west to east along the north side of London, which would amply supply our immense population with the pure element for every purpose in life.

But, to return to our milk for a few moments. It is difficult to procure good healthy milk, even when not adulterated. Indeed, it is vain to expect it while cows are kept in close, confined sheds, and do not breathe the fresh air, nor see a green field for months together—where the want of ventilation and drainage subjects them to the effects of a poisonous atmosphere, in which, surrounded by heaps of dung and other filth, they languish and die of disease. The microscope will show that the milk from such cows is unfit for use.

There is a small treatise on this subject, entitled "Observations on London Milk" by Mr. H. Rugg, Surgeon, published by Bailey and Moon, setting forth the various abominations of this kind that exist in our modern Babylon called London. Another pamphlet is by the Honourable F. Byng, "On the Sanatory Condition of the City of Westminster," in which he describes a shed under the Adelphi arches, where the poor beasts never saw the light of Heaven from year's end to year's end, the place being lighted entirely with gas, and the only ventilation that existed was a small hole not half a foot square, knocked through the wall that forms part of the lane that leads to the halfpenny steam-boats.

A great deal has been said and written about sanatory measures; but I conceive that the legislature would be beneficially employed in passing enactments to insure a good supply of pure water and healthy milk, articles of such paramount necessity, especially in all great cities and towns. If monopolists and their vested rights must still have a name amongst us, let the filthy water companies be compelled to adopt the Artesian-well system, and put to shame the ridiculous deprecation of Dr. Hassell, who, for some reason best known to himself, sides with them, and, suggesting a plan which would only continue the nuisance, he talks about "the merciless boring of the earth," as if the earth were a sensitive animal, and might come under the protection of the Society for the Prevention of Cruelty to Animals. Of the cow-keepers, I would say, let them no longer be allowed to incarcerate the animals in such dens of filth and suffocation, within the bounds of the city and suburbs. Now that the facilities of transit are so great, five or six miles are not an object compared with the great advantage of health to the animals and the wholesomeness of the beverage they supply.

Let us examine the next article of sustenance,—"Our daily bread." When potatoes were cheap and bread dear, the adulteration with boiled and mashed potatoes was more common, I believe, than it is now. The objection to it is, that potato-flour is not so nutritious as that of wheat. Bread is often adulterated with rice-flour, which enables the bread to absorb and retain a greater quantity of water. In this way the consumer is cheated of a certain amount of nutritious wheat farina, the place of which is supplied by water. A more general adulteration is practised, I believe, in the use of alum, which has a twofold object: First, it renders inferior flour in colour and quality equal in appearance to that of superior quality; and secondly, the flour retains a larger proportion of water, and the bread, of course, weighs heavier. Some bakers buy rock-alum in powder; and some, an article known in the trade as "hards," and "stuff,"—this is a mixture of alum and salt. The worse the flour is, the greater proportion of "stuff" is required to make it good in appearance; in some instances as much as sixteen, and even twenty ounces to the sack of flour. The bakers say the public will have very white bread, and that it cannot be made without alum; but a white bread may be made with *good* flour, and it were better not so white than mixed with ingredients prejudicial to health. In 24 samples of bread from different bakers which were examined, not one was without alum.

Our tell-tale microscope says that the cruet-stand is not free from contamination,—that our pepper, mustard, and vinegar are frequently no better than they should be, or rather, not so good. Various adulterations of pepper have been detected. Black pepper is the inferior small shrivelled berries, and often little more than husks, sometimes adulterated with burnt crust of bread powdered. White pepper is the berry divested of its outer coat, the fine granules towards the centre being the most pungent. Pepper being most frequently bought already ground by the consumer, there is every opportunity for adulteration. It is sometimes mixed with powdered husks of mustard. The late Dr. Pereira found sago mixed with white pepper, but that is easily detected by the microscope, the starch grains being larger than those of pepper. Other substances introduced to our pepper-box are, linseed, mustard-seed, wheat-flour, and pea-flour, the sweepings from pepper warehouses, called P.D., or pepper dust, and an inferior kind of this, called D.P.D., or dirt of pepper dust. H.P.D. means hot pepper dust. These may be suspected in peppers which have a dry earthy appearance and an undue quantity of husk when the pepper is darker than usual. But even if we purchase our pepper whole, we are not quite free from adulterations. The ingenuity of man manufactures artificial pepperorns! In Accum's second edition of "Death in the Pot," he tells us that these are composed of oil-cake, common clay, and a portion of Cayenne pepper, fomed into a mass, and granulated by being first passed through a sieve, and then rolled in a cask. With what tenacity our mustard will sometimes hang to the spoon; it is like thick paste, and has not much pungency. "The most common adulteration of mustard is with wheat-flour, and, by some means or other, turmeric-powder is made to part with a portion of its colouring matter to the flour which enters so largely into the composition of the mustard of the shops." In the manufacture of vinegar, there is sometimes a greater proportion of sulphuric acid than is allowed by law, and a smaller proportion of acetic acid than there should be. Vinegar, to be good, should not contain less than 4 per cent. of real acid. The sulphuric acid, it appears, is not necessary, though often added for adulteration; to prevent the ill-

effects of which, the retailers (in compassion for their customers, no doubt) add some sour beer, or cider, or even water. But this is rather an article for chemical analysis than for the microscope; as also our beer. A late conviction at the East-end of London has shown us that our malt liquor does not escape the general pollution; the poor man's beer is first killed with one-third water, and then resuscitated with a quantity of sugar and salt. Some have been known to hang a bunch of tobacco in the cask, ostensibly for fining the beer, but really to give it an intoxicating quality. What is called "finings" is occasionally supplied by the brewer. We sometimes like a little ginger in our beer, and for other purposes; but if we buy it ground, we cannot depend on its genuine quality. It is often mixed with sago-meal or potato-starch, or wheat-flour and Cayenne pepper;—different samples vary—some are compounded with ground rice, cayenne pepper, and mustard husks, sago changed by heat, wheat-flour coloured with turmeric, &c., &c.

I should weary you by detailing all the metamorphoses that things undergo in the way of trade and manufactures. In these last the microscope has been successfully applied to the examination of various textile fabrics. The different fibres employed having each a distinct character, it may thus be determined whether that which is purchased for linen-cloth, or for silk, is entirely composed of those fibres, or has any mixture of cotton or other material, so that the composition of any mixed fabric will at once be made evident to any one who is acquainted with the microscopical structure of the materials made up, and often sold for what they are not.

By way of relief from deceptive appearances let us examine another substance which has become an article of rather extensive commerce. Some ladies, who may not happen to be very deeply initiated in the mysteries of science, would scarcely dream that the sponge with which they lave the delicate limbs of their charming little infants, is an animal, once living and breathing some fathoms under the surface of the ocean, affixed to a rock by an expanded base or stem, where it vegetates, or rather animalizes, like an oyster, in one spot, from the time the wandering gemmule leaving the parent sponge, finds a resting-place, until, full grown, the rude hand of the diver seizes upon it for commercial purposes. Still less would they imagine that this very useful animal, which, when wetted, is beautifully soft and luxuriant to the touch, when applied to the fairest and most delicate skin, is, in some cases, full of sharp prickles, whose points are fifty times finer than the finest needles that ladies ever worked with; yet the microscope tells us that this is one of the great facts of nature. However, there is not much cause for alarm from this circumstance, for, though numerous, they are so sheathed in the horny net work of the sponge that there is no danger of inconvenience from its use; and, in the next place, they are so minute that if any get loose, and penetrate the skin, even of an infant, they would have about as much effect as the sting of a bee in the hide of an elephant.

I will now return to one of the earliest and greatest discoveries in physiological science, namely, the circulation of the blood. Harvey, who is said to have discovered the circulation, never saw the blood in actual motion, although insisting on it. He argued, from the existence of valves in the heart and in the veins, their structure, and peculiar arrangement; "that the blood must flow from the heart, through the arteries to the veins, and from the veins back to the heart again, yet he knew nothing of the connecting vessels called capillaries." All that is now known of these minute vessels, the microscope and the beautiful art of injecting them with coloured fluids has supplied. Malpighi first made the discovery of the capillary circulation about the year 1661, by the microscopic examination of the bladder of a frog, and since then his discovery has been confirmed by many other observers. Leeuwenhoek, the father of microscopic discoveries, has, in his works, given descriptions and illustrations of the method of examining it in a small fish and in an eel. In later times the frog has been principally used for the purpose, and with acromatic lenses it may be witnessed in some of the smaller mammalia—in crustacea, and even in polypiferous zoophytes. It may be seen in the legs of some spiders, and in the transparent wings and antennæ of insects; in the tail of the small fish called stickleback; in the feet and tail of the water-newt, and in the web of the frog's foot. A more beautiful sight is the circulation in the *lungs* of this animal. By dipping the frog into water at the temperature of 120°, all muscular action is stopped; the animal is rendered rigid, but the circulation will continue for a long time. "When the body is opened, one of the lungs must be taken and bent over on a piece of glass placed on the stage of the microscope," and, as Professor Quekett proceeds to say, "the magnificent sight then disclosed will baffle all powers of description."*

In the mammalian class, the wing of a bat or the ear of a young mouse will show it, but the mouse is apt to be troublesome. A little chloroform, however, will quiet either him or the bat, without stopping the circulation of the blood. Perhaps the most novel and elegant object for illustrating this phenomenon is found in a young trout when only three or four days old, and it is the more delightful to witness from the circumstance that it can be shown without confinement or suffering to the animal itself.

In the spring of 1849, I had an opportunity of beholding this beautiful sight, and of making a set of drawings from it. At that time it was introduced to the notice of the Microscopical Society, by Mr. Samuel Gurney, jun., of Carshalton, where that gentleman had, after the plan of Mr. Boccius, succeeded in hatching numerous ova of the trout. The early stages of development of this animal takes place within the egg, and after a period of about forty days the young fish emerges from it, but remains attached to the yelk bag, which affords him nourishment until he is able to provide for himself. A reference to the drawing and diagram will show his mode of existence at this early period, when he is about three or four days old, and scarcely half an inch long. The circulation may then be seen to great advantage. The pulsation of the heart—the rapid flow of blood through the arteries, and its return by the veins in every part of the transparent body, is an exceedingly beautiful sight.

Another grand discovery effected by means of the microscope is that which is termed ciliary movement. Here, again, we find Leeuwenhoek foremost in the discovery; he noticed the cilia in the volvox, and recognised their use. Baker, in 1744, described them in the wheel-animacule, and made a distinction between their rotatory and vibratile motions. This minute but extraordinary animalcule excited the most intense curiosity, and long remained a puzzle to philosophers to imagine how it was possible for any animal to turn its head swiftly round continually in one direction, as this creature appeared to do, having at the anterior part of the body two small organs like wheels, and, like them, apparently moving on their axes. This motion is now well known to be an optical illusion. The apparent wheels of the animalcule are two circular rows of cilia, which have a waving motion given to them by means of the muscular apparatus employed. They do not wave simultaneously, but successively, round the whole circle, thus giving the appearance of a wheel in motion. This may easily be understood by supposing ourselves standing on a rising ground, and looking at a field of ripe corn, on a fine breezy day, with the wind blowing either from the right or left of the field with respect to our position. We shall then witness the beautiful undulating motion of the corn, those undulations moving forward across the field like the waves of the sea. But we know that neither the

* "Quekett's Practical Treatise on the use of the Micro scope," page 372.

corn itself, nor the waters of the ocean, do actually move forward as that wavy appearance does, which is caused by the successive bending down of the ears of corn as the wind passes over them. So it is with the wheel-animalcule ("to compare small things with great"), the successive action of the muscles bending down the cilia so rapidly, that the appearance to the eye is that of rotatory motion. The purpose of this motion is to produce a current in the water—a sort of "miniature whirlpool," which brings whatever particles of matter the water may contain within reach of this voracious little animalcule, who, itself not above one-36th part of an inch long, creates a whirl in the water many times its own diameter, and in this dangerous vortex hundreds of little monads, with other small fry, fall victims to the devouring teeth and jaws of this fell tyrant of the stagnant pool. But how, it may be asked, how is this vortex produced? If the cilia have this downward and upward motion, we should conclude that the water will only be disturbed without producing a current in one direction. Professor Quekett's explanation of this phenomenon is so clear and satisfactory that I cannot do better than quote his own words, from a paper read before the Microscopical Society, in April, 1845, "On the Ciliary Movement in the Gill-ray of the Common Mussel (Mytilus edulis)." He says, "If one of the rays be placed under the microscope with the large cilia uppermost, when the movement is nearly stopped each cilium will be found to present, besides the usual curved motion in a vertical plane, another, although slight, yet important movement on itself, in a direction nearly at right angles to the preceding, which movement occupies just one-quarter of a circle, and is precisely analogous to that of the quills in the wings of birds during their flight, or to what we are more familiar with, namely, the feathering of an oar in rowing. The problem can be easily solved by allowing that the cilia are broader in one direction than in the other, and by giving to each of them a motion similar to the feathering of an oar, before alluded to, and which we find to be really the case. To see this feathering movement in the most satisfactory manner, the cilia must have become nearly quiescent; and if that portion which is attached to the gill-ray, and which may be termed the root, be carefully examined, it will be found to make a circular movement, whilst the filament itself is being bent upwards or downwards, the *cilia* also become alternately light and dark, in consequence of their being of a flattened figure, and the circular movement causes them to present at one time the broad surface, and at another the edge. The root of each cilium is of a globular figure, and Ehrenberg supposes that minute muscles are attached to this part, which gives to it all its motions."

The great improvements that have been made in the microscope of late years show the physiologist that there is scarcely an animal throughout the various classes, both vertebrate and invertebrate, in which these cilia do not exist in some way or other. The motion is either voluntary or involuntary, according to the nature of the functions they have to perform. They are also placed in a variety of ways in different subjects—in some they are confined to the edges, in others to some part of the internal organs. In the *rotifer vulgaris*, as we have seen, they form two circular rows; in others of this class there is only one wreath of cilia round the mouth, as in the *stentor* and *notommata parisita*; others, again, have seven or eight of these wreaths.

I have only space for one more specimen; in this the cilia are distributed over the whole surface of the body, and, as far as I am aware, it is almost the only instance in which they are so placed. I allude to the *volvox globator*, a very beautiful microscopic object, which has engaged the time and talents of eminent men, in endeavouring to determine whether it belongs to the animal or vegetable kingdom.

In the Microscopic Transactions for January 1858, two papers are published on the structure of the Volvox; one by Mr. Busk, and the other by Professor Williamson. Both those gentlemen advocate the vegetable nature of the Volvox. Time will not permit noticing their arguments at length: indeed, to do so might seem here, a dry detail of technicalities; and notwithstanding the decisive manner in which the subject appears to be disposed of, the matter still appears doubtful. It is very remarkable in those papers that, while detailing certain minute particulars relating to the *structure* of the Volvox, they avoid any allusion to the natural habits and evidences of vitality which these beautiful creatures exhibit. Now it appears to me that in our search after truth, we should always scrupulously examine both sides of the question. Mr. Busk's paper mentions Siebold's original view of the vegetable nature of the Volvox, and says:—"Ehrenberg's errors in the case of the Volvox, are not those of direct observation, but in this instance, as in very many others, it is obvious that Ehrenberg has allowed his imagination, working upon preconceived notions, to play the part of reason in the interpretation of correctly observed phenomena; he has thence, in the explanation of what he has *seen* correctly, fallen into great and important errors." "While the recent progress of knowledge," he says—"with respect to the lowest classes of organised beings, places an observer of the present day in a position so much more advantageous, that it is scarcely fair to institute a comparison between Professor Williamson and the great laborious Prussian microscopist at the time his works were written, still it is much to be regretted that these modern lights, clear as they are, have not apparently been allowed to penetrate his mind, and that one to whom science is so much and so deeply indebted should retain views long since deservedly exploded by nearly all competent observers."

Mr. Busk's paper then goes on to describe the form and structure of the volvox, in which description, though in general very correct, there is an error in describing it as a *sphere*. My own often repeated observations have convinced me that the mature volvox is not a sphere, being slightly elongated, and larger at one end than the other. Nor is this error in Professor Williamson's and Mr. Busk's description an unimportant one, since the peculiar form of the volvox is connected with other circumstances attending it, which have been entirely omitted by those gentlemen, as I shall show further on. The grounds on which the vegetable nature of the Volvox is maintained are, 1st. That chemical re-agents act upon it nearly in the same way as upon starch, which is purely a vegetable production. 2ndly. That the cells and their contents are similar in structure to those in many of the Algæ. That these, however, are very doubtful proofs, will, I think appear, from the fact that another substance, called cellulose, is acted on by the same chemical re-agents that change the colour of starch, and is affected nearly in the same way. Now it appears that cellulose exists, not only in vegetable substances, but it is found in many animals, and even in the brain and spinal cord of man. In the Quarterly Journal of Microscopical Science, No. 6, January, 1854, is a paper on this subject by R. Virchow, in which he says—"We are acquainted with a series of varieties of vegetable cellulose, but the substance now in question appears to be distinguished above all by its slight power of resistance to re-agents, seeing that concentrated acids and alkalies attack it more powerfully than is usually the case with the cellulose of plants." Virchow's experiments and observations have been verified by Mr. Busk himself, who, in the course of his paper says, "the corpuscles were starch and not cellulose, and possessed all the structural, chemical, and optical properties of starch, as it occurs in plants."

It appears that Carl Schmidt was the first to discover the presence of cellulose in the ascidians, (a genus of moluscous animals without shells); it was previously only known to exist in plants, but he showed that it was also a constituent of the animal tissue, and the researches of

Kolliker, Lowig, Schacht, and Huxley have established this important fact. Schacht says, "In the mantle of the ascidians there is a substance insoluble in caustic potass, but soluble in sulphuric acid, which is turned a beautiful blue by iodine and sulphuric acid, and which consequently consists entirely of cellulose." The chemical relation of the cellulose itself, however, in the ascidians examined by me, is not essentially different from vegetable cellulose. Caustic potass has no effect upon either; sulphuric acid dissolves both, iodine and sulphuric acid colour both equally blue. Even Siebold says: "I must here remark, that we can scarcely expect chemistry to decide what is animal and what plant, having several times been deceived in our hopes in this respect. The non-nitrogenous cellulose, which at first sight appears to be an exclusive attribute of the vegetable, also occurs pretty generally disseminated in the animal kingdom." Here then, there seems to be an answer to the conclusion that the volvox must be of a vegetable nature because the colour is changed by chemical re-agents.

Siebold then launches his inky thunderbolt against Ehrenberg, accusing him with obstinately adhering to the chain of delusions and errors in which he has more and more closely involved himself from year to year. Then, by way of, "a Roland for an Oliver," in return for the sarcasm on the double-bodied wonder, he commences an attack on Ehrenberg's multiform animalcule, depriving it of all the poetry of its existence by degrading it to the rank of a mere vegetable!

With respect to the second proof of its vegetable nature, namely, the close relationship between the cellular appearance of the volvox and that of algæ and confervæ, it would seem to have as little weight as the former. The great similarity of vegetable and animal tissues in their early stages of development, is now well known to the physiologist. Even Professor Williamson says, "It is only whilst the segmentation of the gemmæ is in progress, that a real relation exists between volvox and young growing confervæ." Even the identity of the two is advocated. Schultze has a paper "On the identity of the colouring matter present in several animals, with the chlorophyll of plants," and Huxley has another, "On the identity of structure of plants and animals," (both published in the "Quarterly Journal of the Microscopical Society," for July, 1853,) in which, after some technical explanations, he says:—"Upon this view we find that all the discrepancies which had appeared to exist between the animal and vegetable substances disappear, and it becomes easy to trace the *absolute identity* of plan in the two, the differences between them being produced merely by the nature and form of the deposits in, or modifications of, the periplastic substance." From these quotations we may see how much difficulty there is in determining where the line should be drawn between the animal and vegetable kingdoms. Mr. Huxley, the gentleman last quoted, appears to indulge a little in the "pleasures of imagination," as Ehrenberg has before been said to do. He observes, "The plant, then, is an animal confined in a wooden case, and Nature, like Sycorax, holds thousands of "delicate ariels" imprisoned within every oak. She is jealous of letting us know this, and, among the higher and more conspicuous forms of plants, reveals it only by such obscure manifestations as the shrinking of the sensitive plant, the sudden clasp of the dionæa, or, still more slightly, by the phenomena of the cyclosis. But among the immense variety of creatures which belong to the invisible world, she allows her dryads more liberty, and the protococci, the volvox, and, indeed, all the algæ, are, during one period of their existence, as animals of a like grade in the scale. True, they are doomed to shut themselves up in their wooden cages, and remain quiescent, but in this respect they are no worse off than the polype, or the oyster, even. Now, this may be all very fine, but of the volvoces not "shut themselves up in their wooden cages." They live and flourish, for a time, in all their beauty. I have kept them in tumbler glasses for as long as four or five months in the summer, and then, from some cause or other, although no change in their treatment had taken place, they languish, sink to the bottom, die, and decompose; a dirty, brownish sediment is all that remains of them, not a trace being left of what they once were. I have never seen any approach to the "hybernating state," the "winter spores," mentioned by Mr. Busk, but I shall now look out for them. I have proposed to myself a mode of examination which I have not yet tried. It is very desirable to be convinced one way or the other, but "who shall decide when Doctors disagree?"

I have said that the mature Volvox is not a *sphere*, as described in the papers before mentioned, and that there are some circumstances attending this creature which have been entirely omitted in those papers. I will now endeavour to describe what I have myself so often observed. The mature volvox, though of a globular form, is not a perfect sphere, being slightly elongated, and larger near one end than the other. Round the interior of this larger end the young volvoces are arranged; they are not promiscuously placed all over the internal surface. The creature always revolves on the long axis, and progresses with the small end foremost, the revolution being at right angles with the onward movement. When at rest the current in the water may be seen flowing from the small end, down the sides over the whole surface of the transparent globe. This current is no doubt produced by the vibrations of the cilia, as in the rotifer before described, only in this case they are distributed all over the surface, each green gemmule, or zoospore, or animalcule, having two cilia, as described by all parties, however they may differ in other respects. When they are quiescent is the time for observing not only the cilia but the connecting threads or tubes. Of these there are usually six, proceeding from the periphery of each green gemmule to as many of its next neighbours, forming a beautifully bright hyaline network all over the surface, or within a very small depth of it. These threads are said by Professor Williamson and Mr. Busk to be sometimes double, and even triple, but I am inclined to think this is an optical illusion. It is difficult to see them at all, but, under favourable circumstances, they appear like extremely fine transparent tubes; these may easily appear to be double. If we hold up a thin glass tube between our eye and the light, we shall see two lines, because we look through a greater thickness of glass at the sides than in the middle, where the rays can pass directly through. In some positions we may see three lines, or only one, according to the direction in which the light impinges upon the tube, and as these tubes lie in all directions in the volvox, the deception may easily take place.

Of the red spots in the zoospores (or animalcules, as disputants may please to call them) there are several opinions—Ehrenberg calls them "red eyes." The vegetable advocates will not allow them to be eyes. Yet Mr. Busk, who calls them brown spots, says, "They all appear to look the same way"—that is, the spots are placed in a corresponding situation in all the cells, on one side, near the narrow end; and this description agrees with the figure given by Ehrenberg. They are also placed in that way in Professor Williamson's figures. It might be a curious point to ascertain if the revolving motion is toward the side that the eyes appear to look. According to Siebold, Nägeli says they are "red oil drops." But whatever these spots may be, they exist in many animals; in the rotifera, and many others; the wheel-animalcule has the red spot; and Mr. Gosse, in describing a parasite of this class which he found living within the volvox, and devouring the young ones, says—"The usual occipital sac carries a large eye, of a rich crimson hue."

There is also in these green gems a circular clear space, which has a contractile property, described by Mr. Busk as being "very regularly rythmical, the contractions or pulsations occurring at intervals of 38 to 41

seconds, and in some cases longer. It takes place suddenly, and amounts to a complete obliteration of the cavity, or vaccuole, whilst the dilatation is slow and gradual." Mr. Busk says this contractility is "a property already known to be possessed by similar spaces or vacuoles in vegetable spores." He should also have said it exists in the animal. Mr. Gosse describes it in the parasite before-mentioned (the Notommata parasita); but he seems determined to class this beautifully organised, active, and apparently living object, along with many others as active, with the vegetable algæ and confervæ. However this may be, it is no more extraordinary that a multitude of animalcules should be located at regular distances upon a world of their own, in a shape of a transparent globular membrane, having threads or tubes of communication, which, for ought we know, may possibly perform the same office to them that our telegraph wires do to us; I say this would be no more extraordinary than the dwellings of the zoophite. In this little tree, with its numerous branches, growing from one small stem affixed to a rock, or an oyster shell perhaps, at the bottom of the sea,—every branch is a double row of houses, built up back to back with the greatest regularity, each house having a living inhabitant, of which there are many hundreds in this small compass. These minute animals form their dwellings without line, compass, or square, and yet no builder amongst us can arrange his brick and mortar houses in more beautiful order.

With respect to the Volvox, it seems a pity to part with it as a vegetable. It would be the most agreeable side of the question to join in Ehrenberg's pleasures of imagination, and fancy those red spots to be eyes. It is admitted that they "all look one way." These vegetables certainly appear to exhibit some signs of vitality. I have never seen them come in direct collision, so as to stop each other when careering in opposite directions; they always glide by very gently. Perhaps the whirlpool which they make in the water gives them notice of each other's proximity. After being at rest for a time, they will suddenly start off and re-commence their revolving and progressive motion through the water. Sometimes two or three may be seen in company, revolving slowly near the same spot for a while; and when congregated near the surface, or on the side of the glass next the light, if the water be slightly disturbed with the tip of the finger or a small pencil stick, they will all sink down to the bottom, as if alarmed. When the water is no longer agitated, they soon resume their previous position.

When the young volvoces are fully developed, they become detached from the inner surface of the parent globe, and revolve freely for a time, another generation may then be seen within these young ones. At length the parent globe bursts, and the young ones roll out and commence their independent life; increasing in size and maturity, until they become like the parent.

I have also had more than one opportunity of seeing the fractured and empty globe revolve through the water as before, for several days after the young had left it, although the edges of the fractured globe appeared ragged, and the globular form partly collapsed. One singular circumstance I have to notice. On one occasion, I had not looked at the volvoces for several days; when I returned I was surprised to find most of the old forms had disappeared, and a new race, apparently a new species, were very actively enjoying their young existence, much smaller than those I had left there, but with larger zoospores and a much thicker hyaline envelope. There apparently some mystery about these beings, which is not yet understood. I am not at all surprised at Ehrenberg's "imagination," when I behold these wonderful creatures, orb within orb, "instinct with life" in in every part, rolling onward in beauty and magnificence, beyond conception to any one who has not beheld them, unceasingly revolving their brilliant, emerald forms in sportive grandeur; while the deep rubies that their eyes seem made of complete the splendour of their gorgeous bodies, a world of separate beings united in one bright globe, apparently animated by one soul, that conducts the shining mass at pleasure, as fancy or occasion leads. The wondrous structure of those splendid beings, with myriads of other minute and beautiful organisms which the microscope has made us acquainted with, may well overwhelm a contemplative mind with astonishment and fervent adoration of that Great Power whose infinite wisdom and goodness shines forth with equal lustre in these as in the greatest and most glorious works of the boundless universe.

DISCUSSION.

Mr. C. Varley said that, in contributing two microscopes to illustrate some of the facts stated by Mr. Leonard, he might observe that they had both been honoured by the Society's Medals. The vial microscope was for continuous observations of plants and animalcules growing therein. The other had a lever movement, for the stage, by which any one object or animalcule, amongst many others, might be kept continually in sight, and all its evolutions observed. This was particularly the case with the *volvox globator*, which, being a shell, with younger globes within it, and those with a third set becoming visible in them, had raised the question whether they were animals or plants, the shell suggesting the idea of a seed-vessel. Transversely they were perfect globes, but longitudinally the hinder part had a tendency towards a point, though not so much as an egg. This hinder part opened, and the young globes (which, when there was room, were rotating within the larger) swam out and rotated. From his experience he could say decidedly that they were animals, and not plants. He could find nothing that bore any analogy to plants; but, instead of being one animal, it appeared to be a family which grew together in one globular shell. There were many examples of animal families; the bell polypus, numbering from one to one hundred, might frequently be seen all growing together like a tree, an animal at the end of each branch. The gonium pectoralia grew together in sixteens. The discovery made by aid of the microscope, that the sap of plants circulated, and that that motion was their life, had shown that plants bore a much closer analogy to animals than was usually imagined. But this fact brought with it a marked and beautiful distinction; animals had arteries and veins, plants had not. The circulation in animals was one whole or united stream from end to end, all the ramifications being open to one another in various directions. In plants it was not so. Plants were composed of cells of variable proportions, in each of which the sap circulated up one side and down the other; each cell was capable of living alone for several days, when separated from all the others, there being no opening or passage from any one cell to another; therefore a plant was a family of living cells, too numerous to be stated by numbers—a family, as it were, of individual lives. Often a very small part of a plant would send out roots and become complete, thus proving that it contained all the principles of life, complete in itself, independent of the plant from which it was taken. When by the microscope we observed the extraordinary delicacy of the cells of plants, the wonder was how they could even bear the wind. This brought to light an important fact, a natural arrangement, which gave security under very rough usage; most of the cells might be compared with a quill, being about that proportion of thickness to the space within. This space contained a most delicate lining, which did not adhere to the outer case, and this delicate sac was filled with two fluids. This was a new fact, and a more marked difference between vegetable and animal circulation. The proper circulating fluid adhered to the lining, and flowed or slid up one half of the tube, over the end and down the other half, again to rise. There was no wall or division between the rising and falling currents to support or separate them, but the central space was filled by a fluid

not soluble in the others, which supported the circulating fluid against the walls of the cell, and was itself dragged into motion by it, thus removing all friction, for whatever friction would occur, it was entirely absorbed in this secondary fluid,—certainly a new and most beautiful arrangement. Now the outer cells or fibres of plants might be bent about and stretched without any violence to the delicate enclosed lining. And here he must record credit to two persons who had really invented what nature had always been using, without their knowing the fact, because it bore so great an analogy to the construction of plants. Commander Beadon invented a life-buoy* which was divided into numerous cells; in each cell there was a thin copper vessel, quite air tight. By this arrangement the outer portion bore all the violence, even to damage, without harm to the loose copper vessels which contained the life of the float—the buoyancy. The second was Mr. Austen who contrived a powerful means of raising sunken vessels, of comparatively easy application. He provided a sufficient number of bags, which, when inflated, could buoy up the vessel. These were made of strong canvass (of course they were not air tight), and were secured to ropes which could be drawn round the weight to be raised. Within these were placed close cotton bags, which, when wet, could bear at least two feet of water pressure without letting the air escape; for it mattered not how deep they might be placed, as they only bore the difference of their diameter in pressure. When these were secured, Mr. Austen commenced pumping air down into all the bags, and thus gradually inflated them, the outer ones bearing all the labour, the inner ones only giving the buoyancy. He had been thus particular, because the broad application of any principle of nature fixed it so much better in our minds.

The usual vote of thanks having been passed to Mr. Leonard for the paper he had read,

The Secretary announced that the following arrangements had been made for the remainder of the present Session:—

May 31.—Mr. R. A. Slaney, (late M.P. for Shrewsbury,) "On Limited and Unlimited Liability in Partnerships."

June 7.—Dr. T. King Chambers. "Industrial Pathology; or the Injuries and Diseases incident to Industrial Occupations."

June 14.—General Meeting to receive the Council's Report and Statement of the Funds of the Society.

July 5th.—General Meeting for the Election of Officers.

Home Correspondence.

DRAWING INSTRUMENTS.

Sir,—In your Journal of the 19th inst., we observe a criticism on our Patent Drawing Instrument, by "a Manufacturer."

We fully expected to hear of objections, especially from "*Manufacturers*," to the introduction of an article the novelty of which is well calculated to offend "old notions;" and the utility and cheapness of which are likely to interfere so seriously with the sale of those "bad instruments" hitherto made, and which your correspondent acknowledges are already being supplanted by importations from the French and German markets.

We shall not offer any remarks upon the contradictory statements "a Manufacturer" makes, nor upon his humbling confession that, although your own Society and the various Government Institutions have been engaged in the "praiseworthy" effort to procure for the poorer artizans cheap, good instruments, you have hitherto failed.

Our business is to answer his objections (whether valid or otherwise) to those samples of our Patent Drawing Instruments, which you have kindly introduced to public notice; and this we do with pleasure.

His first complaint is that, "the joints being made entirely of brass will last a very short time, and will never work smoothly"—that soldering makes the metal soft,—and that there is so much spring in the joints and tubes as to prevent the compasses being used with accuracy.

In reply, we may state 1st,—That the joints of three-fourths of the cheap English instruments, and of all the French and German ones (both best and common) that we have seen, have been composed entirely of brass—not, however, of *hard, bright, rolled* brass, as ours are, but of cast metal, which has been "softened by soldering."

2nd. The *smooth* and *steady* working of our joints is an essential peculiarity, even of the cheapest we make, and is a necessary consequence of the mode we adopt in manufacturing them. This, indeed, is so striking a feature, that it has been the first to elicit commendation from all who have tried them.

3rd. "Soldering" may, and does, soften the joints of all instruments hitherto made, but *not of ours*, which (through a mode adopted in making) are never subjected to an "annealing" heat.

4th. With regard to the spring alluded to, we may say that, if *fairly* tried, it will not be found to be more than that which exists in all other instruments of the *same length*. It is not dependent upon the "tube," which is well known to possess less spring than a solid bar, but is to a certain degree *necessarily* connected with all dividers, if not made unusually heavy. It is no doubt rendered more *apparent* in ours than in the usual three-square legs, by the fine needle points attached to the divider legs, but is not, we are assured, greater in *reality*.

We are, however, happy to have this opportunity of stating that we are now effecting an improvement, which will considerably lessen the "spring" alluded to, and also that we are making joints of *five* plates of *hard, rolled brass and steel combined*, which will not add more than threepence to the cost of a set, and will produce a joint far more durable and accurate than any hitherto made.

The second series of objections made by "a Manufacturer" refers to the pens:—viz., that "the slightest pressure on either side will throw the nibs across," that "the screws are badly made," and that "when the pen is worn to the hollow it will be useless."

That the nibs may be *forced* aside by violent pressure—such as your correspondent appears to have used—we do not doubt; but that they would ever become displaced by ordinary legitimate use we are prepared to deny. As to the pen becoming "useless when worn to the hollow," the objection is more ridiculous than otherwise. It is like saying that a broom is good for nothing when worn to the wood! We do not know how long "a Manufacturer" expects a set of instruments should wear, but when we state that, instead of the pens being made of *soft iron* (of which all cheap pens hitherto have been), ours are made of the best sheet-steel, *hardened and tempered*, and that three-sixteenths of an inch of this *hard steel* may be worn away before the pen becomes "useless," we think no purchaser of a 3s. retail case of instruments will complain.

The meaning of the following sentence we are utterly unable to comprehend. "*The point of the ever-pointed bow pencil is too long, and, if it wears away, will be too short to use!*"

With regard to "the scales being made of card," and being subject to variation, &c., we merely beg to say that they are *not card*, but a waterproof composition, which may be washed with hot water, if required; and that they have twice been subjected, for 24 hours, to the heat of a japanner'

* Vide Transactions of the Society of Arts, Vol. 54.

stove,—a temperature far greater than any they could be exposed to in the hottest tropical climate.

If, however, any person should still prefer the wood or ivory scales, they can of course be supplied.

In conclusion, "a Manufacturer" sums up his complaints by saying that "the joints and screws of all the specimens are badly made: not one works evenly," and that "there are many other faults," &c., which we suppose he has not patience to mention.

In reply to this sweeping condemnation, which certainly sounds more like "a Manufacturer's" bitter invective than the probable and just conclusion of a calm, *unprejudiced* juryman, we beg respectfully to say that we cannot tell what violence your correspondent may have used in his thorough examination of our instruments, but this we can vouch for, that when they left our establishment, *all* the joints, screws, and pens were *correct*.

Apologizing for this lengthy reply, which, once for all, we deem necessary, and thanking "a Manufacturer" for giving us the opportunity of placing these explanations before the public,

We are, Sir,
Your obedient Servants,
JAMES PARKES & SON.

5, St. Mary's Row, Birmingham.
May, 20th, 1854.

WARMING AND VENTILATING BUILDINGS.*

SIR,—I have read with the greatest interest, in your last Number, the article relating to Dr. Arnott's invention, and cannot but think it of the highest importance for the welfare of the community at large. Amongst the fugitive ideas which now and then pass through a man's brain, I have entertained some similar plan, and I am glad to find that Dr. Arnott has carried it out so successfully. Perhaps, while the subject is warm, you will permit me to mention, that, in addition to the above plan, I have been thinking of the possibility of increasing the amount of heat produced, by a current of air passing round the fire-place, and thrown, when heated by means of pipes fitted for the purpose, in any part of the room, so as to make an atmosphere to any degree of temperature that may be genial to the inmates. Radiating caloric cannot produce that effect, and it is known by daily experience that you may burn your face and hands before a large fire, whilst you feel cold in the back. I see that at your meeting a gentleman alluded to the stoves used in France; certainly they offer some advantages; first, a more equal temperature; and secondly, an economy of fuel; still they are very defective. If made of earthenware, which is a bad conductor of caloric, the radiating is partly destroyed; if made of iron, the moisture of the air is absorbed; whilst, on the other hand, when the damper is closed for the purpose of keeping in the heat, the ventilation is destroyed. But I think that the invention of Dr. Arnott may be carried out so as to combine the advantages of a fire-place and a hot-air stove at the same time. I have in my gymnasium, which is a room 50 feet by 30 feet and 18 feet high, with four doors, opening on the garden, and a current of fresh air passing under the floor, in order to prevent the dry rot of the timbers—a *calorifere*, invented by a friend of mine in Paris, (Monsieur Lococq, the patentee, who exhibited specimens at the Crystal Palace). This invention consists of a case made of sheet iron, only 18 inches square, by 3 feet 6 inches high; on the top is a pipe of the same substance, in the shape of a column, ornamented with brass. In the interior of the case is the fire-place, made of cast-iron, isolated from the casing, and having the flue-pipe passing inside the column, affording thereby room for the air to circulate between; the case is supplied with apertures at the bottom, for the reception of fresh air, which becomes heated and rarified, and is thrown into the room by other apertures above the fire-place. By this contrivance the room above mentioned acquires a comfortable temperature, in the middle of the winter, in less than half an hour. This ingenious invention affords, besides, the means of transmitting the heat by pipes to adjoining rooms; and my friend warms the whole of his magazin with a single *calorifere* erected in one of the rooms on the ground-floor. The expense of fuel is trifling. In one of the rooms of the School of Pharmacy, in Paris, where the heating by means of a common stove cost 12 francs per day, without the temperature being raised above 11 degrees, M. Lecocq put one of his calorifères and produced a heat of 15 degrees centigrade at the cost of 30 sous. Now it struck me, when thinking on the subject, that, if the cheeks of common grates, instead of being made with a single plate of iron, were to be made in the shape of a box, having an aperture at the bottom, for receiving the fresh air, and pipes at the top to receive the heated air, and to transmit it wherever desirable, a current of hot air would pervade the place in the same way as it does with the calorifère alluded to, and therefore combine, as before stated, the advantages of a fire-place and a hot-air stove. As a matter of course, the quantity of air heated is in proportion to the intensity of the fire. Should the present suggestion be deemed worthy of attention, I would with pleasure furnish further information on the subject. Meanwhile, I beg leave to say, with regard to the economy in the washing of linen, I cannot agree with the opinion expressed by some of the speakers. Dr. Kane, from Ireland, in his lectures, alluding to the wearing of cotton for shirts instead of linen, made this judicious remark: "Linen wears cleaner than cotton, but I do not wear a shirt to keep it clean; I wear it to get dirty, by absorbing the perspiration, &c., of the body from the skin." This remark requires no comment, it speaks for itself, and is in perfect harmony with physiological laws. I should not, therefore, think it advisable to let the working classes believe that they may dispense with changing, or having their clothes duly washed, in consequence of their not getting soiled. The superiority and the advantages offered by Dr. Arnott's invention, and his liberality in offering it to the public, are obvious enough, without overrating them by including anything which would prove prejudicial in another point of view.

By your submitting these observations to the consideration of the members, I trust they will be appreciated as they are meant. I remain, dear Sir,

Yours, very faithfully.
J. CAPLIN, M.D.

Pendleton, Manchester, May, 14th, 1854.

* This communication was received previous to the last number being issued, but the space was then entirely occupied.—ED.

PUBLIC FREE LIBRARIES.

SIR,—Having had something to do with the foundation of Public Free Libraries in provincial towns, I would offer the following suggestion: Great difficulty is often felt by the promoters of such libraries in making a suitable choice of books. This is more especially the case where the number of volumes obtainable is small, not exceeding perhaps 1500, or even 1000. In such cases the task of selection becomes harder, because only a part of those works which every one would agree were desirable can be chosen. Add to this that in small towns there is often no one of reading sufficiently extensive to decide between the conflicting claims of authors. What I would suggest is that catalogues of works recommended for public libraries should be drawn up under the sanction of the Society of Arts; such catalogues being variously made out from the number of 1000 to (say) 5000 volumes, and the books therein contained, classified under their separate heads. To a person familiar with literature, and assisted by the many biographical works in existence, this under-

taking would give no serious trouble. Its execution would infinitely facilitate the foundation of provincial reading rooms and lending libraries. The cheapest and most desirable editions ought to be noted. If the Society will not interfere in the matter, any individual competent to the task might take it in hand; but it is important that the selection should be not only judicious, but also recommended by high authority. The prices should be stated, so that subscribers having only a certain amount to spend in books, might be able to calculate with accuracy the amount of their intended purchases.

Your obedient Servant,

STANLEY.

Albany, May, 22nd, 1854.

THE PRODUCING CLASSES.

SIR,—I have to apologise to Mr. Doull for not replying at an earlier period to his remarks on Temperance, or Teetotalism. I cannot even now reply, because I am informed by the Secretary of the Society that Temperance discussions are not germane to this publication.

The classifying together "soldiers, sailors, and paupers" in one category, which Mr. Doull objects to, had no reference whatever to their physical or moral worth. They are the three classes subject to a Government dietary, and were therefore quoted as a standard below which the food of working men ought not to be decreased.

I am, Sir, yours faithfully,

W. BRIDGES ADAMS.

Adam-street, Adelphi, May 22, 1854.

ON THE DECIMALIZATION OF COINS AND ACCOUNTS.

SIR,—The criticisms of Mr. James Yates upon the paper of Mr. Miller, being written at leisure, instead of offered at the time, are nevertheless deserving a courteous correction, and I beg leave to offer that briefly, in consideration for the value of your space.

Weights and measures are not immediately comprehended by the title of the paper, and although I have views of my own which favour the substitution of avoirdupois weight for troy, I restrict myself at present to an indication of the following errors in Mr. Yates's calculations:

In representing £900 9s. 9½d. by £900.849, Mr. Miller employed the nearest round number to three places of decimals, borrowing only 11-24ths of the thousandth of £1,—and not "more than half a mil" as Mr. Yates says. The precise decimal equivalent is £900.8485416, not £900.4884816, as given by Mr. Yates.

Mr. Arbuthnot, our fellow-witness before the Committee on the Decimal Coinage, has suggested a compensating method of curtailing these recurring decimals, at once simple and equitable.

Permit me to point out that your other correspondent, Mr. Good, seems to have arrived by his own process at the same results as the rest of us; for, building up the £1 with 1000 coins, as he does, is the same thing as decimalizing its submultiples. Synthesis confirms Analysis.

With the decimalized sovereign, all our gold coinage, all our silver, down to the sixpence inclusive, and, moreover, (if we declare the rimmed penny to be 5 mils) then our copper coinage also, may remain in circulation without violent changes of any kind; and the public mind may be gradually familiarized with the modification of terms by stamping upon future issues from the Mint the relation of the coins to our gold unit; and, better still, by coining the copper mil and its multiples, which, like the centimes recently issued from France, and the bright medals or tokens which are so eagerly sought and paraded, will soon teach their own simple lesson to the masses, and especially to the young of all classes.

It is obvious that the most ignorant workman, whose concern is more with what he has to receive hereafter, than what he may happen to have in his pocket at the moment of any change, will find his sixpence worth 25 of the smallest coins, instead of 24 as in old times; and for every sixpence worth of copper which he may have in his pocket at that moment, supposing that only one rimmed penny be among them, then, that being increased in value to 1 1-5th, the depreciation of the other five-pence to 4 4-5ths will leave him with sixpence, just as before, the sixpence being always the 40th of £1, or 25 mils.

On the other hand, look at the consequences of attempting the revolution proposed by the guardians, *par excellence*, of the poor man's penny. As first explained, it was the penny unit only which that system would retain; a silver coin of 10 pence to be called a franc, was to be struck; the sovereign being 24, such, was to be supplanted by a new piece of 25 francs, or £1 0s. 10d.

Such was the scheme down to the discussion of Mr. Yates's paper in the Institution of Civil Engineers, as illustrated there by his tables and diagrams. Where is it now? Warned of the confusion which must have resulted from the introduction of a dissimilar franc into an Anglo-French metrical system, Mr. Yates has desperately kicked down all distinctions, and adopted the French system in its entirety. Though he does not explain, much less justify his sudden change of plan, it is obvious, from his assigning 22,692.32 francs as the new equivalent for £900 9s. 9½d., that all English coins are by it demonetized at a single *coup*, and imitations of the French coinage substituted. As to accounts, the adjustment of pre-existing obligations, and such trifles, Mr. Yates fixes upon an arbitrary rate of exchange for everybody, at all times, and it turns out to be, francs 25.20 $\frac{840}{186449}$ per £1, not a very tractable element for computation.

Can it be necessary to illustrate the utter impracticability of such a scheme, not to say its injustice, if even practicable? My anti-gallican prepossessions, which have recently dwindled considerably, never extended to the système metrique, and though I cannot adopt Mr. Yates's methods of maintaining the *entente cordiale*, yet when the favourable opportunity occurs I will publish my tables for decimalizing our gold standard of assay, for supplanting troy weight by avoirdupois weight decimalized, and for a convention-money between not only England and France, but the United States and other commercial nations having a gold standard, just as the Convention's thaler of Germany facilitates the reciprocal exchanges of various complicated monetary systems.

J. A. FRANKLIN.

Throgmorton st., City, May 24th, 1854.

ON THE EXAMINATION OF MEMBERS OF LITERARY AND MECHANICS' INSTITUTES.

SIR,—It is very desirable that the real question now under discussion respecting examinations and diplomas should be cleared of all difficulties and indefiniteness and set plainly before the public. The mixing up of the two proposals, that of the Government and that of the Society of Arts, as identical, is calculated to do mischief. True it is they are in perfect harmony, and perfectly consistent with one another, but they are very far from being one and the same proposition. That of the Government respecting examinations for civil offices, is understood to be given up. I regret it, and believe that it might have been carried out with very great advantage to the public and to the classes interested in it; but if this be otherwise determined, it is important that the public should know that this has nothing whatever to do with the distinct proposal of the Society of Arts, which has only an indirect reference to civil appointments. The proposal is, on the one hand to require, and on the other hand to give, such a diploma to the working classes as shall secure to the em-

ployer the intelligence he expects and pays for. It is required in the higher classes of society, in the law, in the church, and in medicine,—why is it not equally applicable to the humbler? It does not propose to set up every office to the highest bidder by examination, but to require a certificate of examination as a *sine qua non*. Every applicant for office must come with a diploma in his hand. Now this is what the cause of education requires; it is idle to say that it is enough to offer a good education; there are thousands and tens of thousands who do not know its value. It is no use to talk of compelling parents to send their children to school; the country is too free, or imagines itself too free, to bear it; but you may and might require a certificate from all candidates for office, and by so doing you will bring home to parents the money value of education; you would render a service to the bestowers of place and patronage; and you would do more than laws of compulsion, or the best offers of a good education for its own inherent value will ever be able to do. The remarks of your correspondent J. C. Buckmaster, in your last Journal, are very much to the purpose. He ably and practically shows the importance of connecting classes and lectures. He also practically points out the difficulties which small Institutions must labour under; but these, I trust, will be removed, not, I must confess, by government interference, which I fear is hopeless, but by evening classes so arranged that different men can lend their assistance in the different subjects; and there are surely few places, however small, where such assistance cannot be collected from the members of an Institute. His remarks on the necessity of a preliminary examination are very much to the point. This would in practice save a great deal, both of unnecessary trouble and of disappointment. How readily this might be carried out in our schools, and have a good and wholesome effect in raising the character of the teaching, thus bringing up the schools of the day to the required standard. On his last remark, that of giving value to the diplomas, the whole scheme depends, and too much importance cannot be attached to the effort to include all who have offices or appointments at their disposal. First, let the Government, as a compromise of what they were disposed to do, declare the diploma a *sine qua non*—let railway directors do the same—let every class of mercantile establishment, every canal company and joint-stock company, be enlisted—and lastly, let the gentry of the country wipe off the disgrace which has hitherto applied to them, in too often preferring ignorance to intelligence in their servants, and require such a certificate before they will enter into any engagement. Attaching every importance to such an effort to raise the humbler classes of the community, let us not be deterred by any cry or any falling off where the cause might have expected support, but rally round our friends in the Institutions so widely spread throughout the country, and identify their names with the greatest boon that has ever been held out to education.]

S. B.

Proceedings of Institutions.

BASINGSTOKE.—The members of the Mechanics' Institution have just concluded the celebration of their thirteenth anniversary by holding an Exhibition of Works of Industry and Art. It has hitherto been usual for this Institution to celebrate its anniversary by a public dinner. A general wish, however, seemed to pervade all classes that something of a more instructive character might with benefit be substituted at this anniversary—that food for the mind was more in harmony with the object of this Institution than food for the body—and that the members might avail themselves of this opportunity to show to the public at large, that its aim is to improve the social, moral, and intellectual condition of all classes within its influence, and to lead the minds of all its members, irrespective of sect or party, to the Divine Author of all the wonders with which this earth abounds. With this view, and having in the first instance obtained the promise of valuable assistance from the Society of Arts, application for support and encouragement was made by the Institution to the neighbourhood, and most nobly has the request been responded to; no local exhibition can have been more signally successful in the attainment of its wishes than that which has just closed in this town. The Committee of Management had but to state their wishes to the nobility, gentry, and other classes, and they were, with scarcely an exception, met with the utmost liberality from all. The use of the Town-hall was readily placed at the disposal of the Institution by the Mayor, and the use of the spacious Corn-market, with its adjacent rooms, were likewise, without the slightest hesitation, granted by the agriculturists and corn-dealers frequenting the market, though at the sacrifice of considerable personal convenience. The South-Western Railway Company, the tradesmen, the mechanics, indeed all parties, seemed to study in what manner and by what means they could best contribute to the success of the Exhibition and the welfare of the Institution. Without entering into a detailed account of its contents, which to the general reader would be tedious and uninteresting, it may suffice to say that the number of contributors was about 270, of whom particular mention will be made only of H.R.H. Prince Albert, who was graciously pleased to patronise the Exhibition by entrusting to the Committee a marble bust (by Adams) of the late Lord Lieutenant of the County (the Duke of Wellington). The classification appeared to be as follows:—Raw materials and partly-manufactured produce; machinery, implements, and models; educational apparatus, furniture, china, pottery, glass, metal work, paintings, sculpture, natural history, &c. With the view of imparting as much information as was practicable to the public, the Committee, with great labour and trouble, attached a descriptive account to each article exhibited, in lieu of furnishing catalogues. This labour was well repaid to them by the evident and constantly-expressed satisfaction of the visitors. Not only was this plan carried out with the larger objects, such as the paintings, vases, cabinets, &c., but in the glass cases with which the largest room was filled, and which contained a vast amount of miscellaneous objects of curiosity, antiquity, and great value, each was found to have its ticket, giving a good account of the article exhibited. It is difficult to state which branch of art or of manufacture was best represented in this collection; but, in order to give the general public a fair idea of its excellence, the following very imperfect list is given of one department only, viz., the most famous painters, whose productions embellished the walls of the chief room:—Carlo Dolci, Titian Guido, Paul Veronese, Ludovico Carracci, Cuyp, Wouvermans, Correggio, Annibale Carracci, Carlo Marratti, Spagnoletti, Guercino, Vandyke, Francia, Rembrandt, Sasso Ferrato, Vander-Bosch, Sebastian Concha, Berghem, Leonardi da Vinci, Teniers, Sir Joshua Reynolds, Gainsborough, Panini, Adrian, Vanderveldt, Gerard Dow, &c. No mention is here made of the more modern painters, nor of the extensive and beautiful collection of water-colours, photographs, and nature prints, which two latter collections were amongst the many other contributions received from the Parent Society in London. The Exhibition continued open for fifteen days; the admission fee on one of the days was 2s. 6d., upon nine days it was 1s., and for five days it was 6d. A day was set apart for children under fourteen years of age, when several persons kindly undertook the duty of explaining, as far as they were able, the objects in the several departments. Upwards of 6,300 visitors were admitted; and, though the expenses incurred by the committee have been very considerable, there is reason to believe that there will be a balance in favour of the Institution of upwards of £150.

DOVER.—On the 28th of April the Museum and Philosophical Institution held its Eighteenth Annual General Meeting at the New Museum Building. The chair was occupied by the President, Dr. Astley. The annual report of the Committee was read by one of the Secretaries, Mr. A. Phillips. From this it appeared that the prospects of the Institution were highly satisfactory, and that there were now 186 members belonging to the Society. The practical results of the union of the Institution with the Society of Arts were pointed out, and were described as highly beneficial. Fourteen lectures have been delivered during the past year, viz., Dr. Lankester, "On the Natural History of Water;" Rev. R. E. B. Maclellan, "On the Pilgrimages to Canterbury in the Olden Times;" Mr. Wheeler, "On the Steam-Engine;" Mr. A. Bottle, "On the Atmosphere;" Mr. Whitfield, "On Physical Education;" Mr. J. Gorham, "On the Microscope;" Mr. Brent, jun., "On Lyrical Poetry;" Mr. Mockett, "On Entomology;" Rev. C. Kirtland (two lectures), "On Ancient Rome, with its Catacombs and Christians;" Mr. H. Crow, "On Astronomy;" Mrs. Balfour, "On the Study of Biography;" Mr. S. G. Mackie, "On Geology;" and, during the summer, Mr. C. Okey, "A Literary Entertainment, or Imaginary Voyage in Monsieur Pétin's Aërial Ship." The lectures had been well attended, and gave universal satisfaction. The report stated that the Reading-room had been much resorted to during the year, and that upwards of fifty valuable books and pamphlets had been added to the library, of which fifteen had been received from the Society of Arts. The Library consists of 1,050 volumes, and there have been 550 issues for perusal during the year. The Treasurer's account was satisfactory, showing but a small balance against the Institution. The report then proceeded to state that the Museum had received a great addition this year, in the presentation by Dr. Plomley, of Maidstone, of the whole of his valuable collection of stuffed Kentish birds and other objects of Zoology, together with a collection of fossils found in Kent. A special room in the Museum had been appropriated for the reception of this collection, where it would be permanently preserved, and made the nucleus of a general collection for a Museum illustrative of the Natural History of Kent, in accordance with the conditions of the gift. A collection of archæological remains, which had been dug up at Sittingbourne, had also been presented by the Rev. J. Vallance, of Walmer. The case of stuffed birds by Mr. Charles Gordon, representing "The Owl Mobbed by Small Birds," which received favourable notice at the Great Exhibition, consisting of birds all shot in Kent, had been placed among the Kentish specimens. It was in contemplation to add a Vivarium, containing Crustacea and Zoophites, so appropriate to a museum situated on the Kentish coast. The report having been unanimously received and adopted, the meeting proceeded to the election of its officers for the ensuing year, when Dr. Astley was re-elected President; Mr. L. Stride and Rev. Wm. Yate, Vice-Presidents; Curator, Mr. J. Friend; Treasurer, Mr. Poulter (the Mayor of Dover); Librarian, Mr. H. Crow; Guardian of the Apparatus, Mr. A. Bottle; Secretaries, Mr. R. Rees and Mr. Phillips; Exhibitor, Mr. Gordon. A ballot for the Committee was then taken, when the following six gentlemen were elected:—Mr. J. R. Mummery, Mr. G. Bennett, Mr. A. Penny, Mr. S. Kingsford, Rev. John Briggs, and Mr. J. A. Briggs.

WHITEHAVEN.—A gratuitous lecture was delivered at the Mechanics' Institute on Friday last, by Major Chambre, on behalf of the National Fund for the Relief of the Wives and Children of Soldiers on Duty in the East. The subject of the lecture was, "Reminiscences of Travel in the Brazils, Mexico, and Jamaica." It was well attended, and the proceeds amounted to £8 16s. 8d.

Miscellanea.

EVENING SCHOOLS FOR ADULTS.—In taking the census accounts were obtained of 1545 evening schools for adults in England and Wales. The amount of weekly payments varied from 1d. to 2s.; in the majority it did not exceed 4d. There were 39,783 students attending these schools, nearly a third of them females. Returns were made of the occupations of above two-thirds; 14,405 were artizans, 4,418 factory hands, 6,709 agricultural labourers, 1,317 domestic servants. Reading, writing, and arithmetic were the things taught in these schools generally, but some were of a superior class. Grammar was taught in 339, geography in 344, history in 172, mathematics in 135, modern languages in 36, book-keeping in 29. These schools are distributed all over the country, but Lancashire and the West Riding of Yorkshire stand at the head of the list of counties, greatly exceeding all others.

MEETINGS FOR THE ENSUING WEEK.

MON. Inst. Brit. Architects, 8.
Actuaries, 7.—Prof. De Morgan, "On the Demonstration of Formulæ connected with Interest and Annuities."
TUES. Royal Inst., 3.—Prof. J. Tyndall, "On Gunpowder."
Civil Engineers, 9.—President's Annual Conversazione.
WED. Royal Botanic, 3½.—Promenade.
Society of Arts, 8.—Mr. R. A. Slaney (late M.P. for Shrewsbury), "On Limited and Unlimited Liability in Partnerships."
THURS. Royal Inst., 3.—Mr. M. T. Masters, "On Botany."
Zoological, 3.
Royal 4.—Annual Election.
Antiquaries, 8.
FRI. Arch. Inst., 4.
Architectural Assoc., 8.
Botanical, 8.
Royal Inst., 8½.—Dr. E. Frankland, "On the Dependence of the Chemical Properties of Compounds upon the Electrical Character of their Constituents."
SAT. Royal Inst., 3.—Mr. James Paget, "On the Importance of the Study of Physiology as a Branch of Education for all Classes."
Royal Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 18th May, 1854.

Par. Numb.
172. Civil Services Estimates—Classes 1 to 5.
236. Small Arms—Report from Committee.
98. Bills—Hospitals and Infirmaries (Ireland).
99. Bills—Portland, &c., Chapels.

Delivered on 19th May, 1854.

202. Imports and Exports, &c. (Australia)—Accounts.
225. Poor Law (Appeals)—Returns.
227. Education (Scotland)—Correspondence.
229. Spirits (Ireland)—Returns.
239. Savings Banks—Accounts.
240. Exchequer—Account.

Delivered on 20th and 22nd May, 1854.

44. Local Acts—No. 53, Ballymena, Ballymoney, Coleraine, and Portrush Junction Railway, (No. 1,); No. 54, Ballymena, Ballymoney, Coleraine, and Portrush Junction Railway. (No. 2,); No. 55, Piers and Harbours (Scotland)—Reports from the Admiralty.
131. Railways (India)—Return.
242. Merchant Seamen's Fund—Account.
243. Mercantile Marine Fund—Account.
256. Railway and Canal Bills—7th Report from Committee.
207. Grand Jury Presentments (Ireland)—Abstract of Accounts.
208. Turnpike Trusts (Ireland)—Abstract of General Statements of Income and Expenditure.
259. Committee of Selection—12th Report.
172. Civil Services Estimates—Classes 6 and 7.
100. Bill—Registration of Bills of Sale (amended).

SESSION 1852-3.

906. Local Rates—Return.

Delivered on 23rd May, 1854.

211. Rural Police—Abstract Return.
238. Newspaper Stamps—Return.
262. Supply—Account of Sums voted from 1835 to 1853.

172. Estimates for Civil Services—General Abstract.
104. Bills—Reformatory Schools (Scotland).
105. Bills—Ecclesiastical Courts.
106. Bills—Cruelty to Animals.

Delivered on 24th May, 1854.

123. Finance Accounts—Classes 1 to 8.
177. Troops (Colonies)—Copy of Correspondence.
101. Bills—Agricultural Averages (Ireland).
103. Bills—Tithe Rent Charge (Ireland).
107. Bills—Sheriff and Sheriff Clerk of Chancery (Scotland).

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 19th*, 1854.]

Dated 7th April, 1854.

816. J. E. Wilson, 30, Great George street, Westminster—Iron girders.

Dated 18th April, 1854.

891. J. Bernard, Club chambers, Regent street—Stitching machinery.

Dated 27th April, 1854.

955. J. H. Johnson, 47, Lincoln's inn fields—Revolving fire-arms. (A communication.)
957. Sir G. R. Farmer, Bart., Bideford—Safety valves.

Dated 1st May, 1854.

970. J. Porter, Salford, and R. Howson, Manchester—Forge hammers.
971. E. Briggs and W. Souter, Castleton mills, Rochdale—Treating silk, &c.
974. W. Macfarlane, Glasgow—Water closets, lavatories, dust bins, &c.
975. J. Fenton, Low moor, Bradford—Safety valves.
976. J. Hamilton, New York—Machinery for crushing quartz.
977. W. R. Palmer, New York—Threshing machines.
978. J. Clarke, Leicester—Knitting machinery.

Dated 2nd May, 1854.

981. J. Mayer, Burslem, and J. D. Kind, Birmingham—Attaching vitreous substances to doors, &c.
982. A. Trueman, Swansea—Sulphuric acid.
983. R. Waller, Leeds—Valves for steam engines.
984. W. E. Newton, 66, Chancery lane—Moulding, &c., compounds of caoutchouc, gutta percha, &c. (A communication.)
985. C. Minasi, Brecknock place, Camden town—Hatching eggs.
987. G. Dié, Paris—Tracing paper.
988. D. Plisson, Paris—Chemical condensing apparatus.
989. Prof. L. Glukman, Dublin—Electric communications in railway trains and vessels.
990. B. Bishop and J. Dyer, Birmingham—Stop butts and other hinges.

Dated 3rd May, 1854.

991. T. Main, Glasgow—Steam engines.
992. J. H. Johnson, 47, Lincoln's inn fields—Lathes. (A communication.)
993. W. W. Richards, Birmingham—Fire-arms.
994. A. E. L. Bellford, 16, Castle street, Holborn—Grinding mills. (A communication.)
995. E. H. Rascol, Catherine street, Strand—Driving bands. (A communication.)
996. M. Poole, Avenue road, Regent's park—Street paving. (A communication.)
997. W. H. Knapp, 37, Cross street, Islington—Hats and bonnets.

Dated 4th May, 1854.

999. E. Barlow, W. Slater, and P. Knowles, Bolton le Moors, and W. Johnson, Farnworth—Cotton machinery.
1001. J. Nasmyth, Patricroft—Puddling iron.

Dated 5th May, 1854.

1003. H. Stewart, 15, Baker street, Bedford square—Pocket protector and pocket.
1005. F. C. Hills, Deptford—Preventing smoke.
1007. A. G. A. Martin and C. Lefol, Paris—Iron wheels.
1009. J. Wonfor, 40, Bridge street, Blackfriars—Manure.
011. V. Wanostrocht, 90, Great Tower street—Cannon and projectiles. (A communication.)

Dated 6th May, 1854.

1012. T. W. Gibson, 13, Thomas street, Stamford street—Pinerium or aerated sarsaparilla.
1013. E. J. M. Archdeacon, Walworth—Bookmark.
1014. B. J. La Mothe, New York—Construction of buildings.
1015. J. G. Jennings, Great Charlotte street, Blackfriars—Earthenware pipes.
1016. B. J. La Mothe, New York—Railroad cars.
1017. J. G. Jennings, Great Charlotte street, Blackfriars—Water to water closets.
1018. H. G. Drewe, Paddington—Metal from ores.
1019. R. Waller, Leeds—Motive power.
1021. C. Cammell, Sheffield—Buffer, draw, and bearing springs for railway carriages.
1023. J. H. Higginbottom, Ashby de la Zouch—Valves for water closets, &c.

Dated 8th May, 1854.

1025. J. Jefferis, Grove, Southwark—Packing pistons and joints.
1027. H. M. Naylor, Birmingham—Instrument for cutting food.
1029. G. B. Goodman, 12, Salisbury place, New road—Apparatus for holding music, &c. (A communication.)
1031. T. Lemielle, Bruxelles—Ventilation.

Dated 9th May, 1854.

1033. W. B. Adams, 1, Adam street, Adelphi—Rails for railways, and modes of connecting and fixing them.
1035. C. Liddell, Abingdon street—Moving boats on canals and rivers.
1037. A. V. Newton, 66, Chancery lane—Artificial stone. (A communication.)

Dated 10th May, 1854.

1039. W. C. Fuller, Bucklersbury—India-rubber springs.
1043. W. Williams, Dublin—Propeller.
1045. J. Lawson, Glasgow—Drawing ships out of water. (A communication.)

APPLICATION WITH COMPLETE SPECIFICATION FILED.

1086. Frederick East, Warminster—Taking photographic views and portraits in the open air by means of vertible machinery attached to a cubical box, by which the changes are seen, and the light and the time of exposure regulated.

WEEKLY LIST OF PATENTS SEALED.

Sealed May 19th, 1854.

2693. Thomas Isaac Dimsdale, of Dublin—The use and preparation of certain solid and liquid substances for the defecation, purification, and decolorization of saccharine juices and syrups or solutions, and for neutralizing, decomposing, and absorbing noxious and fetid gases.
2704. Augustus Radcliffe, of Chichester place, King's cross—Improved construction of glaziers' diamond.
2706. William Joyce and Thomas Meacham, both of Greenwich—Improvements in marine steam engines.
2716. Charles Ramsay, of North Shields—Improvements in ships' and other pumps.
2764. Joseph Scipion Rousselot, of Nimes—Improved application of magneto-electricity for driving machinery, and for neutralizing the impulsive force of machinery in motion.
2716. Edward Joseph Hughes, of Manchester—Improved method of purifying and concentrating the coloring matter of madder, munjeet, spent madder, or any preparations thereof, however they may be made.
2923. Alphonse Médail, of Paris—Improved hydraulic machine.
3026. Henri Catherine Camille de Ruolz and Anselme de Fontenay, both of Paris—Improved metallic alloy.
79. John William Partridge, of Birmingham—Improvements in the manufacture of soap.
157. Charles Clarke Armstrong and William Pursall, both of Birmingham—Improved percussion cap.
351. John Burt Smith and Edward Smith, both of Regent street—Improvements in bonnets.
422. William Gossage, of Widnes—Improvements in the manufacture of certain alkaline carbonates, and in the useful application of such carbonates.
571. Sanders Trotman, of Portman square—Improved alarum night-clock or time-indicator.

Sealed May 23rd, 1854.

2720. Henry Robert Abraham, of No. 11, Howard street, Strand—Improvements in coffins and in hearses, and improvements in receptacles for coffins for their transmission.
2728. William Beckett Johnson, of Manchester—Improvements in steam engines.
2832. George Ross and James Inglis, of Arbroath, N.B.—Improvements in looms.
14. John Collins, of 32, Saint Ann street, Liverpool—Improvements in the manufacture of vinegar.
486. William Patten, of 22, Old Fish street—Improvements in valves and apparatus for supplying water.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
May 23.	3594	Metallic Scroll Guard	Thomas Trotman	Gloucester place, Camden town.

Journal of the Society of Arts.

FRIDAY, JUNE 2, 1854.

EDUCATIONAL EXHIBITION.

The progress made with this exhibition is highly satisfactory. The space applied for by exhibitors far exceeds that at the disposal of the Society, notwithstanding the ample dimensions of the building (St. Martin's Hall) which has been hired for the occasion. Contributions are promised from France, Holland, Belgium, Sweden, and seven Swiss cantons; and from Malta articles have already arrived. Mr. Winkworth, who has been visiting Holland and Belgium with reference to this Exhibition, reports that the Governments of these two countries take considerable interest in the movement, and have given directions to the proper officers there for complete collections to be made and sent over. Besides those from the Governments, there will also be collections from private individuals.

Mr. Winkworth states that he met with the same measure of success at Brussels as at the Hague, the British embassy having procured for him the honour of an interview with the Minister of the Interior. On that occasion the Minister entered very fully and heartily into the object of Mr. Winkworth's journey, stated the measures he had already taken to forward an extensive assortment of educational objects, and promised that the supplemental list of articles with which Mr. Winkworth furnished him should be added to it. This list was the result of interviews with M. Romberg, chef de division au département de l'interieur, and with M. André van Hasselt, inspecteur des écoles normales et des écoles primaires supérieures. Mr. Winkworth bears cheerful testimony to the valuable assistance he received from these gentlemen, and also from M. Steven, secretaire au ministere de l'interieur, M. de Brouckere, Bourgomestre de Bruxelles (who kindly sent his private secretary with him, to several of the more important schools connected with the government by corporation) and to M. Corr van der Maeren, a member of the corporation, who devoted several days to his service. The following letter was sent to Mr. Winkworth by Sir Thomas Waller, secretary to the embassy, and is inserted as additional evidence of the anxiety of the Belgian Government to comply with the wishes of the Society of Arts, as communicated to them by His Excellency M. Van de Weyer:

[TRANSLATION.]

"Ministere de l'Interieur,
"Brussels, May 26, 1854.

"Sir,—I hasten to inform you that the Minister of the Interior will have the honour of receiving Mr. Winkworth at 4 o'clock to-day.

"I avail myself of this opportunity to inform you, that at the request of M. Van de Weyer, His Majesty's Minister at the Court of London, we have collected, in order to be sent to the Society of Arts in London, of which Mr. Winkworth is the representative, a selection of objects for the intended Educational Exhibition, such as drawings, caligraphical and other works, geographical maps, school regulations, compositions, &c., executed by the scholars and teachers of primary schools.

Nine cases, containing these articles, were sent on the 20th inst., to the Minister of Foreign Affairs, by whom they will be forwarded to London.

"I have the honour to be, sir,
"Your most obedient servant,
(Signed) "EDWARD STEVEN."

"Sir Thomas Waller, &c."

Sweden, too, sends not only objects for exhibition, but also a Commissioner to examine and report. From the United States of America there is reason to believe that interesting contributions will be sent by individuals and public bodies, though the Government there can render no direct aid in the matter. Holstein has promised a report on the state of education in that country; and it is not improbable that Russia, notwithstanding the existence of the war, will be represented in the Educational Exhibition. A favourable spirit is also manifesting itself in Germany, and several donations of books towards the formation of a permanent collection are announced. The Council, however, looking at the very short time for correspondence, has thought it right, in order to ensure the receipt of articles for exhibition from that country, to avail itself of the services of Captain Ibbetson, F.R.S., and have deputed him to visit Berlin, Dresden, Vienna, Prague, and the principal towns in Germany. An agent has been appointed at Wiesbaden, to whom all contributions may be at once sent.

At home, too, the prospects are most cheering. The principal Educational Societies have already determined to exhibit, and applications for space have been received from a very large number of private individuals, as well as publishers of books and makers of educational apparatus. In Manchester a large and influential committee has been formed, with Mr. Bazley, the President of the Chamber of Commerce, for its chairman, and it is taking very active steps to procure that district to be properly represented.

The Council has fixed the opening of the Exhibition for Tuesday, the 4th July, when a *conversazione* will be held, at which H.R.H. the President of the Society has intimated his intention of being present.

The Council of the Society of Arts solicits attention to the intended Educational Exhibition at St. Martin's Hall, in June next.

To give full development to this undertaking, to procure the co-operation, not only of the great Educational Societies and Institutions at home, but also in the Colonies and the Continental States, and to illustrate it by Lectures, with practical discussions, a considerable outlay must be incurred.

The Council deems it a duty to secure the funds of the Society from an expenditure which would interfere with its ordinary proceedings, and therefore invites the cooperation of the Members of the Society and of other friends of Education.

The following subscriptions have been already received:

	£.	s.	d.
H.R.H. Prince Albert, President	100	0	0
Amount of subscriptions already published	651	8	0
FOURTH LIST.			
J. Bull	5	5	0
A. J. Hoffstaedt	1	0	0
W. Hutt, M.P.	5	0	0
H. Pouncy	5	0	0
J. Reeves, F.R.S.	5	5	0
Richard Twining	5	0	0

Erratum in Third List, Mr. Beriah Botfield's subscription should be *five* pounds, and not *two*, as printed.

TWENTY-FOURTH ORDINARY MEETING.

WEDNESDAY, MAY 31, 1854.

The Twenty-fourth Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 31st ultimo, W. Tooke, Esq., F.R.S., Vice-President, in the chair.

The following candidates were balloted for and duly elected Ordinary Members:—

Bower, George
Dickson, James Hill
Hunt, F. Knight
Pocock, George Pearce
Sayer, Edward

A model was exhibited by Mr. Watson, of a mode of ventilating buildings. The inventor proposes that an air-shaft, divided into two unequal parts, should be placed at the top of the room to be ventilated, and that by this means two currents could be established—a *downward* current bringing in a supply of fresh air, and an *upward* one carrying off the vitiated air.

The Paper read was

ON LIMITED AND UNLIMITED LIABILITY IN PARTNERSHIPS.

By R. A. Slaney (late M.P. for Shrewsbury).

I have had the honour of being requested to read a Paper to the Society on the Law of Partnership, and the policy of introducing into this country the limited liability of partners.

It happened to be my lot, when a member of the House of Commons in several Parliaments, that I addressed myself with some labour to subjects connected, as I thought, with the social improvement of the middle and working classes, by moving for Committees on Education, in 1838; on Public Walks; on Manufacturers' Employment; on Health of Towns, in 1841, and other subjects of a similar nature. These inquiries led me to consider other circumstances bearing on the encouragement of industry, and I obtained, in 1850, a committee on investments for the savings of the middle and working classes. The inquiry and evidence before that committee led, in February of the year 1851, to a committee on the laws of partnership; of this committee I was chairman. After hearing much evidence, the report was presented in July, 1851. Perhaps it may be allowed me to read portions of the Reports of these two committees:

1st. On Investments of Savings of the Middle and Working Classes;

2nd. On the Law of Partnership.

They are short, and may bring the subject before the Society. I shall afterwards read a few observations on this matter, and conclude with a brief address.

Before reading these extracts, I would state, to open the subject, "That at present no person can advance any capital to any undertaking, public or private, in the profits of which he is to participate, nor to become shareholder in any enterprise for profit, without he become liable to the whole amount of his fortune. Such unlimited liability can be restricted to any given sum or share only by special Act of Parliament, or by Charter from the Crown."

I will now read the report on investments which was adopted, and afterwards part of the proposed Report which was rejected:—

"Your committee think the importance of removing obstructions to the secure investment of their savings, to the middle and working classes, can scarcely be overstated, because this is a consideration upon which the industry, enterprise, and forethought of the classes in question greatly depend.

"Your committee have proceeded to examine existing obstacles to such investments, and to consider how far it may be practicable to remove them, and in what manner this may be accomplished.

"Investments in land, or landed securities, your committee have reason to believe are much desired by the middle and working classes; but the uncertainty and complexity of titles, and the length and expense of conveyances, together with the cost of stamps, place this species of investment, generally, beyond the reach of those parties. Mortgages on land are liable to the same sort of difficulties, and often also prove insecure investments.

"Your committee think that the greatest benefit would be conferred both upon the owners of land and upon the smaller capitalists desirous of purchasing land in small portions, or of lending money in small amounts upon landed securities, by the simplification of titles and the shortening of conveyances; but as the evils in the present law of real property are under the consideration of commissioners appointed by her Majesty for that purpose, and as a measure for diminishing the duties on stamps for small conveyances and mortgages is now before the House, they do not think it necessary to enter into further detail upon this subject.

"The Crown is empowered by Act of Parliament, in certain cases, by charter, to limit the liability of partners. This power, however, has seldom been exercised, does not seem guided by any rule, and involves expense greater even than that of obtaining an Act of Parliament. Your committee has in evidence that the benevolent projectors of a useful undertaking (the Metropolitan Model Lodging Houses for Workmen) obtained a charter from the Crown, which put them to great delay, and cost them upwards of £1,000, the account of which is subjoined. In like manner many enterprises for similar objects are stated to have been prevented by the trouble and expense of such a charter.

"Your committee suggest, therefore, that such charters should be granted with the greatest caution, but at a far more reasonable cost.

"Another subject of complaint before your committee has been the law of partnership, that places obstacles in the way of any body of workmen who desire to combine their money and labour in industrial undertakings.

"In some cases several industrious men work together under regulations of their own, with a small capital; they are directed by managers whom they choose, the goods produced are sold for their common benefit, and the profits are divided among the contributors of capital and labour, in certain proportions agreed to.

"At present the law affords no effectual remedy against the fraud of any one dishonest contributor or partner, and no summary mode of enforcing the rules agreed to for mutual government.

"Your committee are of opinion that the difficulties which affect the law of partnership operate with increased severity in proportion to the smallness of the sums subscribed, and the number of persons included in the association. They think that any measures for the removal of these difficulties would be peculiarly acceptable to the middle and working classes, and would tend to satisfy them that they are not excluded from fair competition by laws throwing obstacles in the way of men with small capitals.

"Your committee are of opinion that in ordinary cases individual energy and larger capital will prevail against the necessarily inferior advantages which these associations must possess, but this is a consideration which the parties desirous to associate are justified in deciding for themselves. And the committee do not doubt that ultimate benefit will ensue from any measures which the legislature may be enabled to devise for simplifying the operation of the law, and unfettering the energies of trade.

"In concluding the Report which is now submitted to the House, your committee cannot but express their strong opinion of the pressing necessity of the subject now referred to them being speedily attended to by the legislature."

The following are extracts from the proposed Report:

"The rapid increase in population and in wealth of the middle and industrious classes within the last half-century, renders this of great consequence.

"The great change in the social position of multitudes, from the growth of large towns and crowded districts, renders it more necessary that corresponding changes in the law should take place, both to improve their condition and contentment, and to give additional facilities to investments of the capital which their industry and enterprise is constantly creating and augmenting.

"It is the conviction of your committee, that if such measures were carried into effect, a stimulus would be given to the industry of the country, likely to cause addi-

tional employment and contentment, without injury to any class, and with added security to the welfare of all.

* * * * *

"Another great obstacle to investment in all undertakings to be carried on by combined capital (whether requiring Parliamentary powers or not), is said to be found in the existing law of unlimited liability of partners; whereby each person taking a share in such undertaking is liable to the last shilling and last acre he possesses.

"Such a risk is thought to prevent many cautious and prudent men (who would often be the best guides or guarantees for the conduct of such undertakings,) from taking any part in them, as is shown in the evidence. In consequence, many improvements of a useful character, which might have offered fair investments for persons in their vicinity, are impeded, or thrown into the management of reckless speculators, little likely to manage them well. It seems probable that many local enterprises of acknowledged utility, as waterworks, roads, improved lodging-houses for workmen, baths and wash-houses, which would have been undertaken by combined capital, are, by the obstacles alluded to, prevented.

"It is in evidence before your committee, that the difficulty in question has impeded many local projects of improvements, some of which might afford a reasonable prospect of fair investments for the middle and working classes.

"The advantage of local investments in the immediate vicinity of shareholders must not be overlooked; the strong interest they are likely to take in enterprises carried on in their neighbourhood, managed by those whom they have long known and trusted, and whom they have chosen, and in whom they have reposed their confidence.

"The advantages arising from self respect, and the pride of associating themselves as such shareholders with their more wealthy neighbours for a common purpose, ought not to be forgotten, and we believe that such local enterprises might safely be left to the discretion of the parties contributing, under due regulations to prevent fraud.

"Buildings and works of different kinds in their immediate neighbourhood, and which they can see day by day, will present to many of these classes a most attractive sort of investment, far preferable in their eyes to any offered to them at a distance, and which may afford them no visible and tangible form of security."

The cost of charters remain nearly as before, but by the introduction of the Act of 15 and 16 Vict., c. 31, in 1851, to legalize industrious and provident societies, which I was fortunate enough to carry through Parliament, some of the evils complained of affecting humble partners in such undertakings, have been removed.

I will now read some extracts from the evidence of this Report, viz.:—

In the evidence of Mr. Ludlow the following passages occur:—

"Are you of opinion, therefore, as on the one hand there is at present considerable difficulty in making investments in land or in landed securities, that on the other, facilities should be given for investments in other speculations, such as mercantile enterprizes?—I think, decidedly, that there should be facilities given for investments in both ways. I think the present law of unlimited liability in partnership matters opposes one very great check to all such investments; I think that law, and it may seem rather a strange opinion, but I think that the law of unlimited liability tends to produce, in many instances, insecurity and fraud as soon as you come to large partnerships.

"Your opinion being distinctly in favour of admitting partnerships of limited liability, with certain safeguards, some of which you have mentioned, do not you consider that it would be proper that the names of all the members, and the amount of capital agreed to be advanced, should be registered?—Yes, I think it would be decidedly advantageous for those partnerships that all persons dealing with them should know exactly how much capital was subscribed, and how much capital was paid up for the time being; and that they should have the means of reaching all the shareholders who had not paid up in full their subscriptions.

"For purposes of local enterprise, either for an improved lodging-house, a bridge to pay tolls, or a mill, in which partners might take shares of different amounts, or for any purpose of that nature, to be carried out by a capital of from 1,000*l.* up to 10,000, or 15,000*l.*, do you think the present law of unlimited liability prevents a person of prudence, caution, and capital, who otherwise perhaps would be the best leader of such enterprises, from taking any part in them?—Yes, decidedly.

"If there was a limited responsibility of partners introduced, is it your opinion that some parties would be found to make advances of moderate sums to enable those parties to carry out their views?—I should think so, decidedly.

"You are decidedly of opinion that facilities given for such purposes, within the law, would create content among those classes, and tend to foster habits of forethought and providence?—I cannot say that I know of any more powerful means of increasing the security of the country.

"Do you see any objection, under reasonable regulations, to giving those facilities?—I cannot say that I am aware of any.

"Are you of opinion, with the experience that we have of the working of this law in other countries, and with the views we now entertain with respect to the necessity of caution, that a law might be framed in this country admitting of limited liability, and yet which would eschew and avoid some of the difficulties that have been met with in other countries?—I should not see any difficulty in framing such a law. It might be made very simple indeed, providing in the first place for complete notice to the public by the addition to the name or style of the partnership, of the words, "with limited liability."

"You think, without giving a distinct opinion upon the subject, that it would be advisable to give facilities to parties who were desirous of trying the plan, to try it?—Yes; I think the law of partnership generally in this country is hampered and fettered in every possible degree.

"Have you turned your attention to the subject of the importance of affording facilities for investments by the middle and humbler classes?—To some extent I have.

"Do you consider it important that obstacles should be removed and facilities given for them?—I think it exceedingly important, and that there are very serious obstacles at present existing.

"Do you conceive that an alteration with regard to the law of limited responsibility, as to certain enterprises, to be conducted under certain regulations and rules, to prevent fraud either between the partners, or between the partners and the public, would be beneficial or the reverse?—I think an alteration would be beneficial. It appears to me that if the experience of all the world is against us, if we find that the system of limited liability has worked well in all other countries, and that no complaints are made as to the principle of that limited liability, that alone, without some very good reason being shown to the contrary, would show that we were wrong, and that the bulk of mankind were right.

"Do not you think that for enterprises of a local nature, and perhaps requiring a moderate capital, say from 2,000*l.* to 20,000*l.*, that in many instances persons of position and education, in the immediate neighbourhood, are prevented from taking any part, or giving the benefit of their advice or council, because they would be liable if they took any share to the whole amount of their fortunes?—I am quite sure that that is so. I may say that that has happened in my own experience.

"Have you considered any of the obstacles that you think may arise from the present laws of partnership?—

The laws of partnership oppose obstacles of various kinds to the improvement of the working classes; but perhaps the most important is the obstacle which they throw in the way of combinations among the workmen engaged in any particular branch of industry, for the purpose of carrying on that industry co-operatively, either with their own capital or with capital which they borrow.

"Putting aside all consideration of the law of partnership as to limited liability, because you have stated that possibly that might not be necessary, would it not be just and politic to give those working people associating together facilities, in the first instance, for preventing fraud among themselves, by summary jurisdiction before a magistrate; and secondly, that of enforcing the rules before a magistrate also?—I should think that hardly anything which the legislature could do, in the present state of society, and the present state of the feelings of the working classes, would be more useful than that."

Mr. Steward, in his evidence, says:—

"Do not you think that if such limited liability were introduced, under reasonable safeguards, many benevolent persons, or persons desirous of giving facilities to improve the condition of the working classes, would be willing to lend moderate sums, say from 100*l.* to 200*l.*, or 300*l.*, to put them in action?—I have not the least doubt that many persons would do so.

"Do you think, from what you have heard among the intelligent members of the working classes and others friendly to them, that some such regulations as those which have been mentioned would go far to promote contentment amongst them, and to remove causes of discontent?—I think it would promote contentment in a very great degree, and that it ought to do so; it would remove one great cause of discontent, and a very just cause."

Mr. J. Stuart Mill, in his evidence, says:—

"Are you aware that amongst a portion of the more intelligent of the working classes, an opinion prevails that the present laws are unjust and unequal, and prevent them having fair play in the use of their small capitals, and which they think is afforded to persons possessing greater wealth?—Yes, and I certainly see great reason in that. The advantages which the possession of large capital gives, which are very great, and which are growing greater and greater inasmuch as it is the tendency of business more and more to be conducted on a large scale; these advantages are at present, not from any intention of the Legislature, but arising from things, into which intention does not enter at all, to a great degree a monopoly in the hands of the rich, and it is natural that the poor should desire to obtain those same advantages by association, the only way in which they can do so. Perhaps I may add this also; I think there is no way in which the working classes can make so beneficial a use of their savings, both to themselves and to society, as by the formation of associations to carry on the business with which they are acquainted, and in which they are themselves engaged as workpeople, provided always that experience should show that these associations can keep together. If the experiment should succeed, I think there is much more advantage to be gained to the working classes by this than by any other mode of investing their savings. I do not speak of political or social considerations, but in a purely economical sense.

"Do you not think it is likely that the intelligence of those men directed to the management of their own affairs would from time to time suggest improvements in the objects to which their attention was directed?—I think we can hardly set limits to the consequences that might arise in the way of improvements, from the feeling that would be diffused through the whole of the persons employed in an undertaking, of personal interest in its success.

"You have also stated in a passage in page 459 "the industrial economy which divides society absolutely into two portions, the payers of wages and the receivers, the first counted by thousands, and the last by millions, is not fit for indefinite duration." Is that the opinion you still entertain?—I do.

"You think that improvements may be made in those respects by carrying out some of the plans we have spoken of in such a way as, without endangering property, would give greater contentment to many of those persons?—I think that the remuneration of capital, properly so called, would not be felt under those circumstances by the intelligent among the working people to be a greivance. And speaking generally, I do not think that they feel so much, either in this country or in others, the inequality of property, considered in itself, as they do the inequality consequent upon it, which unhappily exists now, namely, that those who already have property have so much greater facilities for getting more, than those who have it not, have for acquiring it.

"At pages 469 and 470 of your work you have given the example of the good working of the system in New England, and have enumerated the benefits received from it as many and lasting, and amongst those advantages you particularly mention that the workmen consider this principle as a sort of stepping-stone to enable them to raise their condition by little and little, according to their industry and intelligence, and that it goes far to content them with their humble situation?—No doubt; because it makes their situation not a humble one.

"Do you think, on the whole, that the introduction of the law of *commandite*, with such safeguards, or regulations, or limitations as the wisdom of the legislature might introduce, would be advisable?—I see no reason against it.

"Do you think that if it were introduced, with such regulations, and such safeguards, it would give additional facility for enterprises directed by intelligence, and create additional facilities for the investments of the middle and working classes?—I think it would do both these things, and above all, which is very important, it would enable personal qualities to obtain in a greater degree than they can now the advantages which the use and aid of capital affords. It would enable persons of recognised integrity and capacity for business to obtain credit, and to share more freely in the advantages which are now confined in a great degree to those who have capital of their own."

These extracts show the opinions of persons of great experience and sagacity on this subject. I could have amplified these extracts, or adduced the opinion of other witnesses and other parties, had I not feared to tire the Society by repetition.

In consequence of this evidence, and the increasing interest felt in the subject, I was fortunate enough to obtain in the following year a Committee on the Partnership Laws. Much of the evidence heard before the Committee on Investments applied to that subject, and many other witnesses fortified this conclusion. Among these witnesses were Mr. Phillimore, M.P., Q.C.; Mr. Howell, a partner in the house of Ellis and Co., of Ludgate hill; Mr. Leone Levi, whose Prize Essay on the Commercial Law of the World is so well known; Mr. Cecil Fane, Commissioner of Bankruptcy; Mr. Field, an experienced solicitor, who has since written an able work on it; Mr. Bancroft Davis, Secretary to the American Legation; and others.

I venture to read extracts from their evidence:—

In the evidence given by Mr. Phillimore, M.P., Q.C., the following passages occur:—

"You are aware that the law of limited liability, under certain restrictions, prevails in the United States, in France, and in Holland, and in some other countries? I know that it prevails particularly in France, and Livingstone has taken great pains to insert it in the Code of Louisiana.

"What is your opinion as to the policy of introducing it, under due regulations and safeguards, into this country?—I have the strongest opinion in its favour, and that opinion does not rest on my own judgment only, but it rests also on the opinions of all the great text writers

whom I have read on the subject of French law—Pardessus, Bavard Veyrières, and Monsieur Troplong, who is now a member of the Court of Cassation, and has written two volumes on the subject of partnership; they all agree that it is most desirable, and that it acts as a great encouragement to industry.

"Do you think that such a law of limited liability, if it were fenced round with the safeguards that have been spoken of, and which, although they do not prevail altogether in France, do prevail in the United States, and several states of the Continent, would be likely to open fresh and useful investments for the small capital of the middle classes?—I think one of its great recommendations is, that it will afford a safe and desirable mode of investment of small sums.

"Do you not think that some such opportunity for the investment of limited liability would be useful to the middle classes in local enterprises of various kinds, which are called forth by the increase of population in towns, and so on?—I have no doubt that is one way in which its capital would be very usefully employed.

"Such, for instance, as waterworks, gasworks, and public enterprises, promising to pay moderate profits; such as lodging-houses, washing-houses, and others, that persons have been desirous of having such means of investment, but have been deterred by the unlimited liability which at present exists?—I have no doubt at all that is one way in which the institution would show its utility. I have been reading very carefully Livingstone's Code of Louisiana, and I have observed that he does not think any limitation is at all necessary; he is one of the greatest jurists that ever lived.

"Do you not think that some of the wild speculations in railways and other things arose in a great measure from no safe investment being open to parties of the middle class, and that they were speculations in which they were obliged to invest their savings because no others were open to them?—I have no doubt at all that if, for instance, such partnerships as I have mentioned were more common, railway speculation among the middle classes would not have been carried to the extravagant extent to which it was carried."

Mr. Howell, in his evidence, says:—

"In consequence of communications with other gentlemen interested in commercial matters, has the question referable to the policy of introducing limited liability, or what are called partnerships *en commandite*, been one matter which has engaged your attention?—Yes?

"In consequence of that division of opinion, were queries circulated by your committee, and sent to different places abroad, from whence they thought valuable information might be elicited?—Yes.

"Is this the title of the report you have received, 'Replies from foreign countries to questions relating to the Law of Debtor and Creditor, and to the Law of Partnership, circulated by the committee of merchants and traders of the city of London, appointed to promote the improvement of the Law relating to Debtor and Creditor?'—Yes.

"In that work there is given, in the first page or two, an introduction, stating the mode in which the inquiry was carried on, signed, 'by order of the Committee,' by 'W. Hawes, Chairman,' and countersigned by the Secretary. Then there is stated a 'list of the cities and towns from which information has been obtained, and the names of the firms, and others who have kindly afforded it.' It comprises Paris, Rouen, Lyons, Marseilles, Grenoble, Bordeaux, Besançon, Cambria, Antwerp, Brussels, Aix-la-Chapelle, Basle, Berlin, Leipsic, Amsterdam, Rotterdam, Hamburgh, Bremen, Trieste, Cadiz, Madrid, Oporto, Milan, Venice, Turin, Naples, Stockholm, Gottenburg, Russian Finland, New York, Boston, Baltimore, and Philadelphia?—Precisely.

"The answers in favour of it appear to be from Holland, and from the commercial States of America?—The answers, I conceive, are generally favourable?

"Have you turned to those particularly from the commercial States of America—for instance, from New York and from Boston?—Yes.

"Do you think that the answers which have been given have made any difference in the opinion of those for whose benefit they were sent?—Undoubtedly.

"What effect has it worked upon the minds of those gentlemen to whom they were sent?—Upon several it has changed their views of the subject, and they are now favourable to that principle of limited liability in partnerships which, at first, they conceived to be wrong; but I would rather that gentlemen should express their own opinions than that I should endeavour to express them. I will express my own opinion, but I hardly like to presume to express theirs.

"Hope and Co. write:—'It cannot be said that the failures of *commandite* partnerships are more frequent than others, and they are not worse; the amount of the capital employed must be published.' Messrs. Sichel and Co. write:—'*Commandite* partnerships are proved by experience to be advantageous to the community, but are subject to all the vicissitudes of commerce.' Messrs. Mendelsohn, of Berlin, write:—'These partnerships appear to be useful. There is no reason why the law should prevent a person taking a share in the gain and loss of business, instead of merely lending his capital.' Mr. J. Brown, of Boston, writes:—'The commercial effect of these partnerships has been beneficial; great activity is hereby given to trade; failures are not more frequent or more disastrous than in other partnerships, nor have they been abused in periods of excitement; and under the laws creating them they are not liable to more abuse than other forms of partnership.'

"Do you consider that the establishment of the law *en commandite* in this country, guarded by restrictions against fraud, such as perhaps our sagacity might enable us to add with those which have been found practically useful in America, would work well for the benefit of the middle classes in this country?—Most undoubtedly; it is in my opinion the greatest boon within the power of the Legislature to confer upon the industrious classes.

"Do you think it would open a fair ground for investments of sums of a medium nature, which now it is difficult to invest?—Certainly.

"Do you think that persons of moderate capital, living either in country towns or commercial districts, would feel glad to have an opportunity of investing, under the management of persons selected by themselves for their honesty and for their skill, moderate sums in manufacturing, or commercial, or other enterprises?—I do think so.

"Do you think that to persons of energy, industry, and talent, but who have not capital at disposal, in many instances persons of capital cognizant of those qualities would be willing to give encouragement and assistance?—Undoubtedly.

"By affording to them the means of capital, lent to carry out those plans which they may have put before them?—Certainly.

"On the whole your opinion, after having looked at the subject with a good deal of attention, is, that it would be beneficial?—Decidedly.

"Is not the American evidence, in the great commercial cities of New York and Boston, favourable to it?—Highly so; and the testimony deserves special attention. The general opinion is, that they are as safe as other partnerships. There is very little distinction drawn as to their relative safety."

Mr. Commissioner Fane, in his evidence, states:—

"Do not you think that such a law would enable parties of moderate capital, combined together, to carry out enterprises which separately they cannot do?—Certainly.

"Do you not think that it would enable parties desirous to run a certain amount of risk, but not desirous to go to the risk of their whole fortune, to advance moderate

sums for the aid of enterprising men of good character?—I have no doubt of it. I am myself convinced that there would not have been such masses of money sent to South America immediately after the war was over if persons could have invested their money in enterprises in England without incurring a risk of (to use Lord Eldon's phrase) losing every shilling and every acre that they had in the world; saving persons who had got something to dispose of, which was the result of their acumulations, and which they had no immediate means of investing in any enterprise under their own eye, did not know what to do with their money, for the law of England said, that they should not risk a portion of their fortune without risking every farthing they had in the world; and, in order to invest their money at what they considered an advantage, they were not unwilling to throw it away in South America, because they did not dare to risk it in England, and I really believe that the millions that were sent to foreign states about that time were merely sent because there was such a desire in this country for investing money in speculations; and the law of this country did not permit a man to invest a small portion without risking the whole.

"With reference, for instance, to waterworks, gas-works, bridges, highways, ferries, and, now lately, lodging-houses and wash-houses, and any other public enterprises connected with the accommodation and improvement of our great towns springing up around us, do you not think that if there had been facility for obtaining limited liability, there would have been investments by the middle classes in such undertakings, very usefully made?—I certainly believe so; I think that limited liability would have produced as bold enterprises in the cases to which you have alluded as limited liability has produced in the case of railways; clubs I might mention as another instance, for in clubs there is limited liability; every member contributes a small portion, and he risks nothing more; the consequence is, that we live in palaces.

"Do not you think that, generally speaking, people might be left to manage their own affairs, and that they are usually prudent enough to see whether they are properly managed or not?—Certainly. I do not think the Government is to act as a nurse or a guardian.

'You stated that you are of opinion that the law of unlimited liability prevents ingenuity and ability, as discovered by the humbler classes in various ways, being carried out successfully?—I think so.

"And that it therefore acts unjustly and unfairly towards those classes?—I think so."

Mr. Bancroft Davis, Secretary to the American Legation, gave the following evidence:—

"Do you not think that, in countries in which the law of limited liability does prevail, people of the humbler classes have a better chance of bringing forward ingenious inventions than in a country where such a law does not prevail?—I do.

"And that, therefore, in the United States, for instance, where such a law prevails in the northern parts, the working classes of inventive minds have a better chance of advancing and improving their condition than they have in a country where it does not prevail?—Yes.

"The upshot of your evidence relative to these difficulties attending the decision of disputes between partners appears to be, that it amounts to an absolute denial of equity and justice to persons of that class who may wish to associate together for such purposes?—It is so, certainly. It leaves them all at the mercy of each other.

"So that, putting aside the question of limited liability, the difficulty of settling disputes between partners by going to the Court of Chancery, is such as almost to deter any sane man from ever thinking of entering into partnership?—That is so as to large partnerships—partnerships of many.

"Is not that injustice to the middle and humble classes?—I say, great injustice."

"You have stated that there has been a considerable number of partnerships of this nature lately in the large towns?—Yes, in the large towns.

"Does it appear to work well?—My own opinion is that it does work well; and that the number of failures (I can hardly use the word "bankruptcies" because it has a technical meaning) under that law is much less than among those who are doing business in the ordinary way. This opinion also is one gathered from hearsay.

"Are the shares in such undertakings held by persons of moderate means?—They may be held by those persons.

"Do many of your skilled tradesmen hold shares in such things?—In those sort of corporations, in banks, and in railways, the subscriptions are opened at some place for anybody to subscribe, and very frequently three or four shares are taken up by a person at 100 dollars a share (that is, 20*l*.,) so that they are quite within the reach of anybody.

"Do the more industrious of the working classes, who have got up a little capital, frequently invest their capital in shares of this nature?—I should say they did; but you will remember that the state of society is different in America from what it is here.

"Do you think that the humbler classes having shares in the works which go on in these various towns which you have spoken of, gives them contentment?—I can hardly conceive of any other state of things in America. We are all working people there, and it is impossible for a gentleman who has not been there to comprehend the state of society. The differences in condition are much less marked than in Europe; there is less accumulated capital, and labour becomes capital more rapidly than in an older country.

"In point of fact, the superior portion of the working classes who have accumulated a little capital do take shares in the various enterprises which are carried on in the towns around them?—They do; if there is any one thing that distinguishes the people in New England, it is that nobody is contented with his present condition, and that will account for a good many things which I cannot account for otherwise. Everybody is struggling for something better.

"Do not you consider that such a feeling is a stimulus to enterprise and activity?—Certainly.

"And that it is beneficial to the classes amongst whom he lives, much more than a man sitting down in apathy and doing nothing?—I certainly do; I have been brought up amongst it."

I fear the reading evidence, though short in itself, is tedious, or I could greatly multiply citations to the same effect, and could add much more from other sources.

I will, before I read the Report, only add, that in the appendix, p. 159, will be found the following queries:

"It has been proposed to limit the liability of partners to the amount of their respective subscriptions in certain companies or partnerships duly registered.

"It has been thought by some persons that such a measure, properly guarded by regulations to prevent fraud and rash speculation, may assist useful investments for the combination of capital of the middle classes, and aid useful local enterprises.

"It is proposed that this measure should not extend to banking, insurance, or other employments for capital of a very speculative nature.

"Such partnerships of limited liability, under certain rules, are established in France, Germany, Holland, and the United States of America.

"It is desired by some parties that such partnerships should be introduced here.

"Your opinion is requested on this subject, with such suggestions as you may think useful."

The replies to these queries, with the exception of those from Lord Brougham and Mr. B. Ker, were generally favourable to limited liability. Of these I shall, however, mention only three English testimonies.

1st.—Mr. Stuart Mill, whose name stands high, and whose works are quoted at home and abroad, the Adam Smith of *this day*, leading statesmen and lawyers to improvement by reason.

2nd.—Mr. Babbage, whose name is known and honoured wherever science and scientific discoveries are prized.

3rd.—Mr. G. R. Porter, a lost lamented friend, secretary to the Board of Trade, well known to all, learned in commercial statistics, and author of the "Progress of the Nation";

and all these were strong in favour of limited liability. Some able foreigners, and other persons acquainted with the working of the law abroad, speak to the same point.

A letter from the Bengal Chamber of Commerce to the chairman, strongly advocates the alteration of the law of unlimited liability. I venture to read some extracts:—

"Understanding that the law relating to the co-partnerships is likely to be brought before Parliament during the present Session, and this Chamber being of opinion that partnerships with limited responsibility would prove of the greatest importance to this country, I am desired to communicate the sentiments of the Bengal Chamber of Commerce regarding the same; and the Chamber will be glad if you can make them known in the proper quarter, and trusts it may calculate upon your influence in bringing about the desired change.

"Now it is equally clear that the redundant riches of this magnificent country must remain as hitherto undeveloped, and a large amount of funds, but in many hands, kept unemployed, without the aid of such associations; because no individuals can command a sufficient amount of capital for the purpose, or would be likely to direct it to such ends if they could.

"All experience proves that it is to associations alone that we can look for undertakings of magnitude connected with public interest and utility; as witness the canals, railroads, &c., of England, to which she is indebted for so much of her prosperity; to say nothing of France, Holland, Belgium, and the United States of America, in all of which countries this limited responsibility partnership which we advocate exists. In Holland, a large portion of the land in the country has been reclaimed or gained from the sea, through the operations of societies with limited responsibilities. So, again, in the United States and Belgium. But it is not necessary to multiply instances to prove their advantage, since every one in the present day must have sufficient evidence of it before his eyes.

"As regards this country, it is impossible to estimate the good they might produce. We might have land companies; agricultural companies, embracing of course cotton; carriage companies, roads and railroads, and steam navigation companies, &c., &c.; all of which are required in order to extend the production, as well as the consumption capabilities of the country.

"The chamber is not prepared to say how this limited partnership law may be carried out, or whether the French system of partnerships '*en commandite*' would be the best adapted for the purpose. This will, no doubt, be fully discussed in Parliament when the measure is brought forward; the immediate object of the Chamber is to draw your attention, and to enlist your influence and assistance in its favour.

"We are quite satisfied that many native and European capitalists, as well as retired Indians, would very willingly invest portions of their means in projects of which they approved, were they relieved of all liability beyond the amount of the sum so invested, but who would have nothing to do with them if their responsibility were unlimited."

I now proceed to read the Report of 1851:—

"The subject referred to your Committee is one of great and increasing interest. On account of its wide relations to large classes of society, your Committee have thought it incumbent to proceed with caution, and to weigh carefully the arguments and evidence adduced before them, urging alterations in the law.

"The Committee of last Session, on Investments of the middle and working classes, partially investigated the question now referred to your Committee, but gave no opinion upon it. Their Report contained two recommendations of great consequence to large classes:

"1st. That Charters of Limited Liability, for useful undertakings, should be granted by the Crown with due caution, but at a far more reasonable cost.

"2ndly. That where several industrious men work together, with a small capital, the law should provide a remedy against fraud on the part of any dishonest partner, and a summary mode of enforcing the rules agreed to for mutual government.

"In entering more closely on the consideration of the subject referred to them, your Committee would adopt a few lines from a former Report, and say—

"'That the great change in the social position of multitudes, arising from the growth of large towns and crowded districts, renders it more necessary that corresponding changes in the law should take place, both to improve their condition and contentment, and to give additional facilities to investments of the capital which their industry and enterprize is constantly creating and augmenting.'

"Your Committee would also add, in the words of their predecessors, 'That they doubt not ultimate benefit will ensue from any measures which the Legislature may be enabled to devise for simplifying the operation of the law and unfettering the energies of trade.

"Your Committee also desire to record their conviction that if it be desired to promote association among the humbler classes for objects of mutual benefit, no measure will tend more directly to this end than one which will give a cheap and ready means of settling disputes of the partners, and enforcing the rules agreed to for mutual government.

"Your Committee beg to state that in addittion to the augmentation in the amount of personal property, is to be remarked its great division among large classes of the community, in the middle (or even the humbler) ranks of life, as is shown by the returns of amounts of public stock held by each person, and other sources of information.

"Your Committee would observe that the course of modern legislation (the wisdom of which appears, in this particular, generally allowed) seems to have been gradually to remove restrictions on the power which every one has in the disposal of his property, and to remove those fetters on commercial freedom which long prevailed in this country.

"Your Committee now proceed to consider whether any suggestions of a like nature ought to be made in reference to the laws of partnership, and especially the unlimited liability of partners, as it exists at present in this country.

"By the existing law, no person can advance any capital to any undertaking, public or private, in the profits of which he is to participate, nor become partner or shareholder in any enterprise or profit, without becoming liable to the whole amount of his fortune, as expressed by a great legal authority, to his last shilling and his last acre.

"Such general and unlimited liability can be restricted to any given sum or share only by Special Act of Parliament or Charter from the Crown; neither of which is obtained without much difficulty, expense, and delay, and in many cases cannot be obtained at all.

"It is contended, that, however advantageous the law of unlimited liability of partners may be, as applied to the principal commercial transactions of this country, carried on by the most part by firms of few partners, that yet it would be of great advantage to the community to allow limited liability to be extended with greater facility to the shareholders in many useful enterprises, often promising at the same time public benefit and private profit, which are constantly called for by the increasing population and wants of our towns and populous districts; such as water works, gas works, roads, bridges, markets, piers, baths, wash-houses, workmen's lodging houses, reading

rooms, clubs, and various other investments of a like nature, chiefly confined to spots in the immediate vicinity of the subscribers. Large stores for the sale of provisions and other necessaries in populous districts, and supported by the combined capital of small shareholders, may be considered as belonging to the same kind of enterprises.

"Your Committee think it would be a subject of regret if cautious persons, of moderate capital, and esteemed for their intelligence and probity in their several neighbourhoods, should be now deterred from taking part in such undertakings by the heavy risk of unlimited liability; yet such persons would in many instances be the best guides for their humbler and less experienced neighbours, and their names would afford security that the enterprise had been well considered, and was likely to be well conducted.

"Your Committee think that it would be desirable to remove any obstacles which may now prevent the middle and even the more thriving of the working classes from taking shares in such investments, under the sanction of, and conjointly with, their richer neighbours; as thereby their self-respect is upheld, their industry and intelligence encouraged, and an additional motive is given to them to preserve order, and respect the laws of property.

"Your Committee would therefore reccommend that under the supervision of a competent authority, rules should be laid down and published for the guidance of persons applying for such charters, with requisite precautions to prevent fraud; and on compliance with such rules, that charters should be granted. Security for compliance with such rules might be given and enforced at the quarter sessions, or before some other local tribunal of requisite authority.

"Your Committee now proceed to consider the propriety of permitting the introduction of partnerships, on the principle of limited liability.

"Your Committee have referred to the report and evidence given before the Commission on this subject in 1837, where opinions entitled to great weight, were almost equally divided; in the Appendix to that Report is the outline of a proposed law on the subject, by Mr. Baring, a name highly respected in all commercial circles of the world.

"In the Report on Joint Stock Companies in 1844, valuable information on matters closely connected with this subject will be found; and in the Report on Investments, of the last Session, evidence bearing on this enquiry is worthy of perusal.

"Your Committee, considering the extent and importance of the proposed alteration in the law, are unwilling to proceed in such a matter without the greatest caution. They find that the best authorities are divided on the subject, and that it would require great care to devise the checks and safeguards against fraud, necessary to accompany such a general relaxation or change in the law. It seems also the opinion of the best informed persons, that additional facilities are wanting to settle partnership disputes in accounts, and that some cheaper and simpler tribunal should be afforded than the costly and tedious process of application to the Court of Chancery.

"That the law of partnership, as at present existing, viewing its importance in reference to the commercial character and rapid increase of the population and property of the country, requires careful and immediate revision.

"They recommend, therefore, the appointment of a Commission, of adequate legal and commercial knowledge, to consider and prepare, not only a consolidation of the existing laws, but also to suggest such changes in the law as the altered condition of the country may require, especial attention being paid to the establishment of improved tribunals to decide claims by and against partners, in all partnership disputes, and also to the important and much controverted question of limited and unlimited liability of partners.

"Your Committee would express their conviction that it is no less consistent with the spirit of recent legislation than conducive to the public advantage, and the promotion of legitimate trade, to relax any restraints which may now exist on the free action of individuals or application of capital, due regard being paid to the importance of preventing the acquirement of undue or undeserved credit, or giving encouragement to ignorant or reckless speculation."

This is the Report adopted by the committee, but the draft drawn up by myself, as chairman, recommended—"That the law of limited liability of partners as in usage abroad should, under due regulations, be adopted here, but not extended to Banking, Insurance, Mining, foreign trade, or other enterprise of a like speculative and uncertain nature."

I may also state that, in the Committee on Partnership in 1837, the opinions were divided as to the policy of limited liability. Against it were:—Lord Overstone, Messrs. Tooke, Larpent, Horsley Palmer, and Kirkman Finlay. For it were:—Lord Ashburton, long known as Mr. Baring—the first name in commercial matters—in the House of Commons; Mr. G. Norman; Hon. F. Baring; and Mr. Senior, the able political economist.

In the Committee on the Joint Stock Act (third Report, 1844), there were examined thirty-eight witnesses, some as to frauds, many as to the necessity of improving the law, and some as to partnership. They were divided in opinion. Since the Committee in 1851 the question of limited liability has much advanced. It is supported by the press, by public opinion, and by several able works, including those by Lord Hobart; by Mr. Field, an able and experienced solicitor, published by Longman, 1854; by Mr. Woodford Brookes, Barrister, 1854; and by Mr. C. Buxton, in his treatise entitled the "Pros and Cons of Partnership," Spottiswoode, 1854—an able and concise work on this subject.

The Committee of 1851 recommended a commission on the subject. This was issued by the present Government, consisting chiefly of eminent lawyers, with a few great merchants, but containing no statesmen or representatives of the industrial classes. I asked to be an unpaid member of this commission, but it was not thought fit to grant my urgent request.

The Commissioners have not yet published their Report, but I have seen a copy of it, and it is such as might be expected, hostile to limited liability, though in favour of charters at a cheaper rate. There was, it is believed, a difference of opinion and divisions in it on some important points. Still it is a step in advance, for charters are recommended for many combined undertakings on easier terms than before.

I believe the commissioners were altogether opposed to the principles of limited liability, unanimous in favour of cheaper charters being granted, and divided on a proposition of a friend of mine, which may be considered a kind of compromise between limited and unlimited liability, by which loans might be granted to persons for carrying on commercial enterprises, such loans to bear interest varying with the profits, and to be postponed to the claims of their creditors with limited liability. The commissioners say that, with a view to obtaining well considered opinions on the subject, they framed a series of questions, which they thought calculated to elicit information, and caused them to be widely circulated both at home and abroad. The result was, that they had been much embarrased by the great contrariety of opinions entertained by those who favoured them with answers. Gentlemen of great experience and talent had arrived at conclusions diametrically opposite, and in supporting their conclusions had displayed reasoning power of the highest order. It was indeed difficult to say on which side the weight of authority in this country preponderated. The opinions received from foreign countries preponderated in favour of limited liability, but many of their foreign correspondents, while bearing testimony to the beneficial operation of the law as to partnerships with limited

liability in their countries, suggested that it might, nevertheless, well be that the circumstances of the trading interests in the United Kingdom might give it a very different operation here. The Commissioners next proceeded to say that, having considered the question whether the proposed alteration of the law with regard to limited partnership liability would operate beneficially on the general trading interest of the country, had come to the conclusion that it would not. They had not been able to discover any evidence of the want of a sufficient amount of capital for the requirements of trade, and the annually increasing wealth of the country, and the difficulty of finding profitable investments for it seemed to them sufficient guarantee that an adequate amount would always be devoted to any mercantile enterprise holding out a reasonable prospect of gain, without any forced action upon capital to determine its direction. Now I do not want any such forced action, but what I do want is this, that greater facilities shall be given for the profitable investment of the wealth which the Commissioners admit is annually increasing, whilst there is a difficulty of profitably investing it. They further say, with regard to limited liability, that it cannot be doubted that instances occur where men of probity and talent would derive benefit from such a system, but they are of opinion that such benefit has been greatly overrated. Well, as I have stated, the Commissioners recommend that further facilities should be given for obtaining charters, but on the whole subject of partnership they say that, although the details of our mercantile laws are inharmonious and imperfect, they "deem it unwise to interfere with principles which in their judgment have proved beneficial to the general industry of the country."

Having stated the general result of committees and works on the subject, showing the great preponderance of authority and names now in favour of limited liability being permitted, under proper rules to prevent fraud, I must tell you that there are eminent names on the other side. They are chiefly eminent lawyers, great bankers, great capitalists, governors of the Bank—in short, either timid men, unwilling to move at all, or millionaires, or the representatives of the class of capitalists who are anchored and bound down to their present moorings by the weight of wealth they stand on. I would not say this invidiously; doubtless they speak honestly, but it is almost impossible for those benefitting by a monopoly not to be (unknown to themselves) swayed by prejudice towards that which augments their wealth and power under the existing law. Hostile to all safe combinations and investment of *limited* capitals, millions of small and moderate sums are swept by force of circumstances, at low interest, into the hands or tills of these bankers or capitalists. By the same means the public funds, the only *possible* investment open to many, are kept at an unnaturally high price.

I would contrast with those *against* the relaxation of the law, those for it, and ask you to remark that among them you will find men of high statesmanlike views, desirous to give security to property, facilitating its peaceful acquisition by industrious multitudes, men who would encourage enterprise and ingenuity, by allowing them to be duly rewarded. Above all, you will find among them those who earnestly desire to improve the social condition of the middle and working classes—who wish to give them the true means to help themselves by forethought, frugality, skill, industry, and conduct—to create and preserve wealth in which they are permitted to participate, according to certain just and equitable rules.

Thus, gradually and peacefully, might the *broad dark line* which separates the opulent from the humble be *softened*, and improve, to the increased safety of one class, the augmented contentment of the other, and the ultimate and enduring benefit of both.

I have now ended an outline of what has lately taken place respecting the great question of partnership. I have given the reports of committees, extracts from the evidence, names of important witnesses, and marshalled a little before you the weight of authority of great names, of benevolent and thinking men. There are those, however, in this great community—many, doubtless, in this assemblage—and those the *thinkers*, and eventually the *leaders* of society, who, whilst they respect (reasonably respect) *authority*, and pay due, but not devoted, deference to *great names*, look still more anxiously than to names and authority, to facts and reasons to support any proposition. To them I now turn myself, and hope they will forgive me if I change from reading a paper to address them from a few notes which I hold in my hand, in a way which may relieve the monotony of a mere lecture, and perhaps elicit some results useful to us all.

The greatness, the wealth, and the comfort of the people of any country depend, as it appears to me, upon three main causes:—First, the natural advantages of the country; secondly, its acquired advantages; and thirdly, its social regulations. With regard to the natural advantages of this country, we have first our insulated situation, giving us for centuries past safety—giving us every advantage that can be had by our wide extended coasts for the commerce of the world—and giving us great and important natural advantages. Secondly, we have a climate more equable, perhaps, than that of any other country in Europe, of which one of our monarchs remarked, that there are more hours in the day in which a man may enjoy himself out of doors in this country than in any other country in Europe. But is that all? It gives us a constant industry; it gives the means of working from early morn till night during the whole year. These are some of our natural advantages. It allows out-of-door work to go on continually. What have we besides? We have vast mineral wealth, greater than the gold of California or Australia—mines of iron and coal—short words, but having a wide and extended meaning. Iron means arms and ploughshares, tools and engines, bridges and aqueducts. It means those vast bridges that span the Menai Straits, one of which now stands the monument of the genius of one who is an ornament to this or any other country—I mean Mr. Stephenson—and it means, moreover, railways, which are now the highways for the whole world. These are some of our natural advantages. But have we not more? In that short word "coal," besides the fire which gives comfort in our dwellings, it is the foundation of our great hardware manufactures; it moves by steam all our factories; it gives employment to myriads of women and children—the tender sex and the tenderest age; it moves all our trains; it moves half our vessels. Coal and iron together mean a moving power equal to millions of pairs of hands, requiring neither clothing nor food to maintain them. The coal which is obtained in Great Britain alone amounts to thirty-seven millions of tons annually, whilst the produce of all Europe amounts to only seventeen millions of tons—not half what is raised in this island. Now, what are our acquired advantages? They are still greater than our natural advantages. First of all, after a century of struggle, we get our religious freedom by the Reformation of 1530, and after a century of contest we had our civil freedom established by the Revolution of 1688. This country has afforded an asylum to foreigners from intolerance and bigotry in other countries, which has been repaid by a hundred inventions and discoveries. Our freedom was won, as Burke says, by our ancestors, owing to their spirit in the hour of contest, and their tenderness in the triumph of victory. Freedom is the mother of many blessings—of order and security, of industry, and enterprise, of wealth and plenty. Now, let us look for a moment at the effects of these natural and acquired advantages combined with the forty years' peace we have till recently enjoyed. Look at the changes they have produced, calling for corresponding alterations in the laws and corresponding facilities in our commercial transactions. But I have spoken of our social regulations as the

third cause of the greatness, safety, and happiness of this country. What has the change been? First, in the population. In 1780 our rural population was to the civic population as 2 to 1; now the proportions are exactly reversed, and the population of our cities and towns employed in manufactures and commerce are as 2 to 1 of those employed in agriculture. From the census of 1801 you will find there has been a general increase of the population of 15 per cent—in the rural population of 10 per cent., and in our great cities of 30 per cent.—that is, those who possess personal property in our cities have increased threefold as compared with the other portion of the population. I hold in my hand a little work ("Results of the Census of Great Britain in 1851") from which, with your permission, I will read a few extracts, as bearing upon the great changes to which I have alluded:—

"The most important result which the enquiry establishes, is the addition in half a century, of *ten millions* of people to the British population. The increase of population, in the half of this century, nearly equals the increase in all preceding ages; and the addition, in the last ten years, of *two millions three hundred thousand* to the inhabitants of these islands, exceeds the increase, in the last *fifty* years, of the eighteenth century. Contemporaneously with the increase of the population at home, emigration has proceeded, since 1750, to such an extent as to people large states in America, and to give permanent possessors and cultivators to the land of large colonies in all the temperate regions of the world, where, by a common language, commercial relations, and the multiplied reciprocities of industry, the people of the new nations maintain an indissoluble union with the parent country. Two other movements of the population have been going on in the United Kingdom,—the immigration of the population of Ireland into Great Britain, and the constant flow of the country population into the towns. The current of the Celtic migration is now diverted from these shores, and chiefly flows in the direction of the United States of America, where the wanderers find friends and kindred. * *

"It is one of the obvious physical effects of the increase of population, that the proportion of land to each person diminishes; and the decrease is such, that within the last fifty years the number of acres to *each person* living has fallen from 5.4 to 2.7 acres in Great Britain—from *four* to *two* acres in England and Wales. As a countervailing advantage, the people have been brought into each other's neighbourhood; their average distance from each other has been reduced in the ratio of 3 to 2; labour has been divided; industry has been organized in towns; and the quantity of produce, either consisting of, or exchangeable for, the conveniences, elegancies, and necessaries of life, has, in the mass, largely increased, and is increasing at a more rapid rate than the population.

"One of the moral effects of the increase of the people is an increase of their mental activity, as the aggregation in towns brings them oftener into combination and collision. The population of the towns is not so completely separated in England as it is in some other countries from the population of the surrounding country; for the walls, gates, and castles, which were destroyed in the civil wars, have never been rebuilt, and the population has outgrown the ancient limits, while stone lines of demarcation have never been drawn around the new centres of population; tolls have been collected since a very early period in the market-places, but the system of *octroi*, involving the examination, by customs' officers, of every article entering within the precincts of the town, has never existed. The freemen in some of the towns enjoyed, anciently, exclusive privileges of trading, but the freedom could always be acquired by the payment of fines; and by the great measure of Municipal Reform (1835), every town has been thrown open to settlers from every quarter. At the same time, too, that the populations of the towns and of the country have become so equally balanced in number—*ten millions and a half* against *ten millions and a half*—the union between them has become, by the circumstances that have led to the increase of the towns, more intimate than it was before; for they are now connected together by innumerable relationships, as well as by the associations of trade.

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"The vast system of towns in which half the population lives, has its peculiar dangers, which the high mortality and the recent epidemics reveal. Extensive sanitary arrangements, and all the appliances of physical as well as of social science, are necessary to preserve the natural vigour of the population, and to develop the inexhaustible resources of the English race. The crowding of the people in houses in close streets, and the consequent dissolution of families, arising out of defective house-accommodation, are evils which demand attentive consideration."

I have quoted these passages to show the vast change which has taken place in the state of this country within the last half-century, calling, as I submit, for corresponding changes in the laws affecting it. It may further be observed, that whilst the population has increased in the ratio I have mentioned, the average duration of life has also increased—showing that, with all these changes, persons are upon the whole more healthy than formerly. There is a statement of the increase of personal property in this country since 1815, as furnished by Mr. Porter. In 1815, land was valued at £34,000,000; messuages and houses at £15,000,000; mines, £600,000; railways put down nil. In 1848, the several values stood thus: land, £42,000,000; messuages, £39,000,000; mines, £2,000,000; railways, £6,000,000. Thus showing the increase of property which is leasehold or personal, or indicative of the prosperity of the middle classes, to be 250 per cent. in 23 years. Now, when we have these facts before us—facts which can be proved by returns to which I could refer you, I say when this is the case, does it not show the necessity there is for giving additional means for the safe investment of this largely increased amount of personal property of the middle classes of the population?—additional means for those numbers of persons who have acquired it to make the most of that which they have acquired. I only ask for that fair-play to which I believe in my heart they are entitled. Here are other indications tending to the same result. In 1815, legacy duty was paid upon £24,000,000; in 1845, it was upon £45,500,000. The amount of property insured against fire was in 1815, £387,000,000, and in 1845, £722,000,000, and so also with savings banks and building societies; that is, property has been spread into the hands of a greater number of people than was formerly the case, instead of being congealed and conglomerated in large masses. But I may be considered as overloading the cause for which I am pleading, and you may think it is time for me to come to my deductions. Be it so. I think we are bound to take these facts as proved. What are the now means of investment? Is it land? We have already seen by the reports of the committees to which I have referred, that there is difficulty attending investments in land. The same may be said with respect to mortgages. Instead of being divided into debentures, like railway bonds, passing from hand to hand, as personal property does, they have around them all the difficulties which surround investments in land for the middle classes. You have to prove titles, and altogether the process is so difficult, that mortgages are all but a closed book as investments for the middle classes. And can you say that it is desirable for the humbler classes to put their money into farming operations. In this respect great changes have taken place. Small farms have been conglomerated into large ones, requiring more capital, and more intelligence, but fewer occupants. Then you may say there is the public funds? I have had that put to me. Why, the public funds, instead of increasing, have diminished during the forty years' peace we have enjoyed, as the means offered to pay off a portion of the public debt, and the proportion that comes into the public market is much less than it formerly was, inasmuch as large portions are locked up every year by trustees. Then, again, as to local enterprise for public or private profit. I have stated the immense increase that has taken place in the population, calling for numerous local improvements, gas works, water works, drainage of lands, markets, wash-houses, and baths and lodging houses, but for these a separate act of parliament is required, which is both difficult and costly to obtain, thus creating obstacles in the way of investments of that kind. It was exactly so in respect to the enclosure of commons a few years ago, but when Parliament was wise enough to pass a general enclosure act, 250 commons might be enclosed

in a year, and the expense reduced from 400*l.* or 500*l.* to 20*l.* or 30*l.* Then the middle classes have, operating against them, the great difficulty which we are this evening met to discuss, that is to say, if any person takes part with them he is liable to his last shilling and his last acre. This unlimited risk, I contend, prevents union, and checks enterprise, and puts a stop to the combination of small capitals, by which the community at large would be benefitted. This is a view of the matter as regards the mere question of investment only, but I believe there is a higher and more important view than this; I believe it impedes rewards to faithful servants and clever workmen, and has also a tendency to widen the differences between the employer and the employed. What is the true principle of wages? It is the proportion between capital and numbers. If capital is free you would be enabled to try peacefully and quietly those useful experiments which would soon demonstrate that strikes are a mistake, and it would afford an opportunity of undeceiving them with their own capital. I know those who are the best friends of the working classes who earnestly wish for an opportunity, if strikes are a mistake, to prove the mistake through their own means; but at present I say they are hampered with a harsh law, and have not fair-play. I would quote the words of an eloquent and able judge, now no more; they were the last words he ever uttered. "If," said he, "I were asked what is the great want of English society, I would say it is the mingling of class with class—I would say that want is the want of sympathy." I ask what could be more valuable than to give the means whereby men of different classes might combine to try a useful experiment in this particular direction. The workmen think the profits of the master are too high and the wages too low. Now can they be better undeceived, if they are wrong, than by letting them try the experiment for themselves? I could point out many means in which moderate capitals could be beneficially employed, but to do so would be to occupy you too long. I will not now detain you further than to say I have expressed strong opinions on this subject, which opinions I have fortified by the facts and figures I have adduced. The experiment of limited liability has been successfully tried abroad, and I believe it would operate most beneficially in our own country; and in my mind, until this be carried out, with such checks and safeguards as the legislature may see fit to impose, I think there will be just ground for thinking that in this law, at all events, fair-play is not afforded between the classes of the people in this country.

A discussion was commenced, but, on account of the lateness of the hour, it was moved and seconded, that it be adjourned to Monday, the 12th of June, at 8 o'clock, p.m., when Mr. John Elliott, who was in possession of the meeting, will open the proceedings.

The SECRETARY announced that on Wednesday next, the 7th of June, being the last Ordinary Meeting of the present Session, Dr. T. King Chambers would read a Paper on "Industrial Pathology; or the Injuries and Diseases incident to Industrial Occupations."

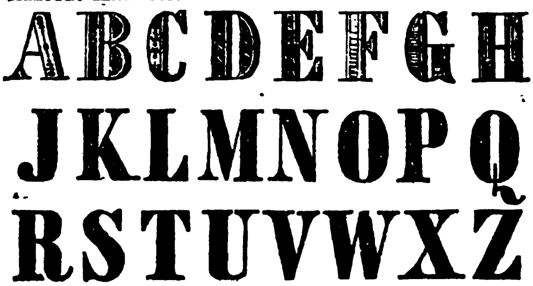
ELECTRO-MAGNETIC ENGRAVING MACHINE.

By WILLIAM HANSEN, OF GOTHA.

The want of a rapid and cheap mode of producing illustrations in connection with letter-press printing, has long been felt, and every day the necessity becomes more and more urgent. Wood engraving, which is now used for the purpose, however good in its results, takes some time in its preparation, and requires the employment of a skilled artist. Various chemical inventions for producing a means of surface printing have been made, and modifications of the electrotype processes have been used for this purpose. None of these means are sufficiently satisfactory or comply with the necessary condition of rapidity and cheapness of production. Recourse has been taken therefore to mechanical means for obtaining the desired end, and a machine has been invented by Mr. W. Hansen, which appears to perform its work well The machine is somewhat on the principle of the well-known planing machine. The drawing to be copied and the plate to be engraved are placed side by side, on the moveable table or lid of the machine; a pointer or feeler is so connected, by means of a horizontal bar, with a graver, that when the bar is moved, the drawing to be copied passes under the feeler, and the plate to be engraved passes in a corresponding manner under the graver. It is obvious that in this condition of things, a continuous line would be cut on the plate, and, a lateral motion being given to the bed, a series of such lines would be cut parallel to and touching each other, the feeler of course passing in a corresponding manner over the drawing. If, then, a means could be devised for causing the graver to act only when the point of the feeler passed over a portion of the drawing, it is clear we should get a plate engraved, line for line, with the object to be copied. This is accomplished by placing the graver under the control of two electro magnets, acting alternately the one to draw the graver from the plate, the other to press it down on it. The coil enveloping one of these magnets is in connection with the feeler, which is made of metal. The drawing is made on a metallic or conducting surface, with a rosined ink, or some other non-conducting substance. An electric current is then established so that when the feeler rests on the metallic surface, it passes through the coils of the magnet, and causes it to lift the graver from the plate to be engraved. As soon as the feeler reaches the drawing and passes over the non-conducting ink, the current of electricity is broken, and the magnet ceases to act, and by a self-acting mechanical arrangement the current is at the same time diverted through the coils of the second magnet, which then acts powerfully and presses the graver down. This operation being repeated until the feeler has passed in parallel lines over the whole of the drawing, a plate is obtained engraved to a uniform depth, with a fac-simile of the drawing. From this a type-metal cast is taken, which, being a reverse in all respects of the engraved plate, is at once fitted for use as a block for surface printing. The illustrations which are given below have been pro-

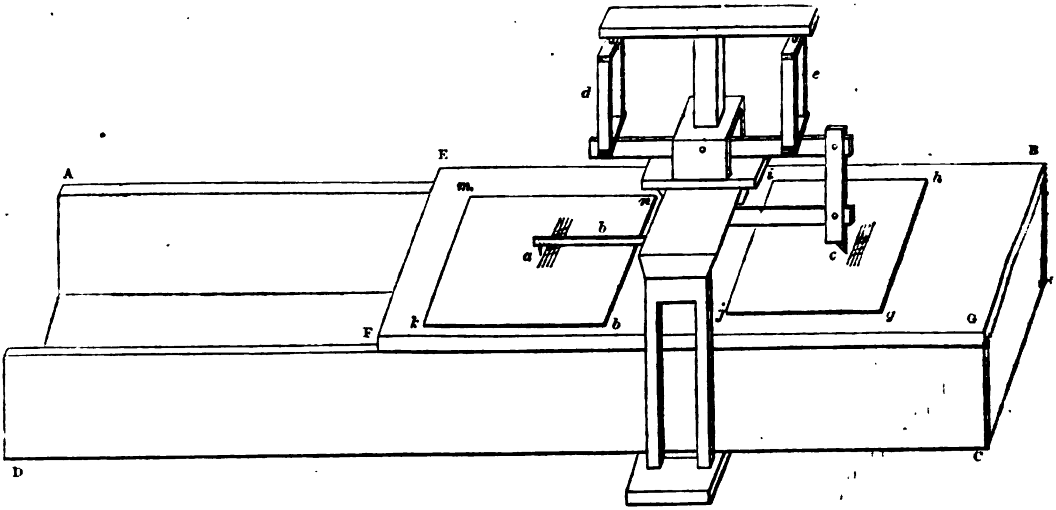
ELECTRO-MAGNETIC ENGRAVING. ILLUSTRATION No. 1.

Electro-Magnetic Engraving. Illustration No. 2.



duced by this process; they must not be looked upon as perfect specimens, but simply as the first productions of the machine and an earnest of what may be produced hereafter. The annexed diagram shows the arrangement of the instrument. A, B, C, D, is the frame on which the bed E, F, G, traverses; *m*, *k*, *b*, *n*, the drawing to be copied; *j*, *g*, *h*, *i*, the plate to be engraved, *a*, the feeler connected with the graver *c*, which works on a lever carrying the armatures of the two electro-magnets, *d* and *e*, which act alternately to raise or depress the graver, as the feeler passes over the conducting or non-conducting surface of the drawing.

Electro-Magnetic Engraving Machine.



Home Correspondence.

ON RAW MATERIALS FOR THE PAPER MANUFACTURER, OR RAG SUBSTITUTES.

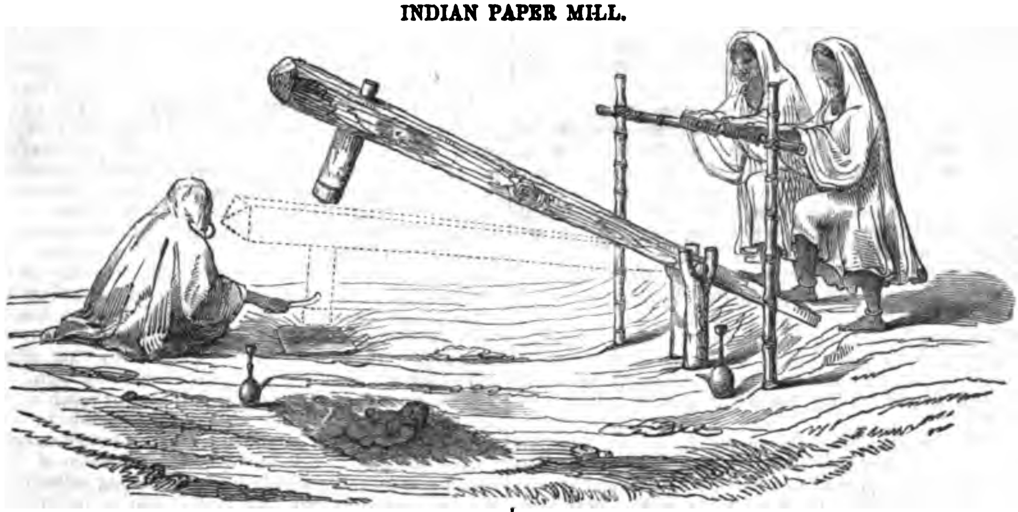
Sir,—I have endeavoured in the following communication to meet one of the suggestions of Doctor Royle, in his valuable and comprehensive paper on Indian fibres, by offering a few observations of a practical nature, the result of some attention to the subject during my residence in India, confining myself however in this letter to that branch of the matter more especially referring to materials suitable as cheap substitutes for rags in the manufacture of paper, and the best methods of collecting them in that country for commercial purposes on an extensive scale. We have abundance of experimental knowledge on the subject, all indicative of the great resources of our Indian possessions in fibrous materials—Doctor Royle very properly refers to the superabundance of riches at his disposition—whole regions of his subject, he admitted, were still untouched. We have therefore a rich mine to work upon, only requiring a combined effort in its exploration. The latter object would be best accomplished, I believe, by the formation of a Central Committee in London, composed of parties interested in the development of these resources, in communication with agents in India, who, being acquainted with the requirements, trade values, and suitability of fibrous materials, should be provided with the means of operating in the various substances which might present themselves.

The subject of paper materials is one of great magnitude, and must be entered on with enlarged views, and on an extensive scale; articles of small price are peculiarly sensitive of charges, and it is only by large operations that an average of low charges can be accomplished. Without occupying time in discussing various points of the subject which present themselves to my mind, I shall endeavour as briefly as possible to offer a sketch of such a method of procedure as I think would be found calculated to eliminate the undoubtedly immense resources of our Indian possessions for supplying our wants in the material in question, presuming that some such arrangement as I have mentioned, of forming a Central Committee or Company in fact, in London, were in existence, and proper agents selected acquainted with the subject, and empowered to act in India.

I propose that the raw materials be prepared from suitable fibrous substances, into the state of blocks or bricks of what is called half-stuff, that is, fibrous matter reduced to a crude pulp and dried, so as to render it convenient for transport, and calculated for being submitted to the further process and superior machinery of this country. For the purpose in view we find ready as it were to hand in India a simple and admirable machine in universal employ by the natives, and to be found in almost every house, where it is used in many of the processes of their simple arts, such as the cleaning or husking of rice, the preparation of drugs, dye stuffs, brickdust (in building purposes), tobacco, tan, and a multitude of other uses, amongst which the manufacture of paper, the subject which now interests us in this inquiry, takes an important rank. The machine in question is called a Dhenkee, and resembles in principle our European tilt hammer.

The accompanying sketch of the machine in question will at once explain its nature, better perhaps than a page of description, it represents an oriental paper mill, admirably adapted for the objects we propose. Its cost would be, erected in place—engineers, foundations, and all charges included, three shillings, and this charge supposes

INDIAN PAPER MILL.



the more than usually heavy machine employed for paper making. It consists of a log of any heavy wood, about 8 inches square, and 9 or 10 feet long, shod with iron, striking on a block of wood or stone. Two women placed at the tail of the lever raise it about 60 times per minute. One woman, seated at the head of the machine, turns over the substance being operated on. The mill occasionally stops, in order that a child may be suckled, or to take a smoke, but nevertheless its daily work might be estimated (depending of course on the description of stuff) at about 20 to 30lbs., reduced to the state of a crude half-stuff. The three women would be remunerated, (if paid labourers and not members of a family), at one ana, or 1½ each. An additional male hand would be requisite, (probably the master or contractor), whose business it would be to wash and pass the crushed material through a simple search or selve, into a vessel of water, returning the insufficiently prepared portion to the Dhenkee; and, to form the pulp into blocks and bricks, in a 12-inch brick-mould, and drying them in the sun. His wages would be two anas or 3 pence per day of ten hours, so that the total wages for the preparation of 20 to 30lbs. of such material would amount to seven-pence half-penny.*

On the head of the materials to be employed for this preparatory manufacture, it has been already stated that they are of great variety, more or less suitable to the production of good paper. The native paper-makers generally employ old bags—sunn hemp, which they prefer to all other materials—old fishing nets, or any such refuse. Rags are very scarce, inasmuch as the labouring classes require or wear but little clothing, which at their demise is burnt with them.

Theoretically, almost any vegetable substance will yield a fibre which may be converted into paper; but the requisite conditions of an abundant and cheap source require discrimination. The attempts to manufacture paper from straw, wood, peat, &c., in this country, can never compete with the resources of tropical countries, and the result of the laudable efforts made in the former direction have shown that by the time the fibre has been extricated from these materials in a fit state for the art, the cost in labour and chemicals has resulted in an account, showing that as good a material might have been obtained as cheaply in the ordinary rag market. Any discovery, however, which will tend to keep down the prices of the latter matters, should receive encouragement. It is to India we must look for extensive and cheap supplies, for it is there alone we find the necessary conditions of very low-priced and intelligent labour, with an abundance of elementary suitable materials. Advantage should be taken at the source of these conditions, by rough-shaping the work, as I may term it, and then bringing to bear on it, our civilized labour and beautiful machinery.

It would occupy too much space and time to attempt to enumerate the varieties of vegetable matter in India which might be applied for obtaining fibre; a few of them, however, may here be noticed, such as the banana, or plaintain leaf-stalk; the aloe; the abundant mudar, *Asclepias gigantea*, which contains a very fine silky fibre in its bark, probably equal to flax for our purposes, and something resembling gutta percha in its milky juice; bamboo leaves, employed by the Chinese; the shéeal khanta, *Argentea mexicana*, the most abundant of weeds, and containing a very large quantity of good fibre, easily pounded out of it (as also an abundance of seed, which produces an oil with the qualities of linseed oil); the stems of the ginger plant, now quite worthless, as they will not burn; as also, all the scitamenea family—all containing a large quantity of very strong silky fibre, somewhat like that of the pine apple. In the hills we have various tree barks, of unsurpassed quality; also the rheea nettle fibres. The Chinese employ one of the mulberry family for their very beautiful papers, which induced me to experiment on the bark of the refuse stems of the mulberry plants employed by the silk growers. From this material I obtained a very good tough half-stuff, suitable for bank note paper.

From the great abundance and extensive cultivation of the banana or plantain, which surrounds almost every house, it is probable this material would form one of the first objects of attention by paper-material collectors; but, from its coarse, stringy nature, it would be cheaper in the state of fibre than as half-stuff. This plant offers great advantages for our views generally, for it is truly in the position of refuse, inasmuch as it has already paid the charges of its cultivation by its products in fruit; the interior of the plant, or true flower-stem, is eaten as a vegetable by the natives, the lower part being perfectly mild, whilst the upper extremity, near the bunch of fruit, pours out, on cutting it across, a limpid fluid, which is very acrid and deleterious, and is a true substantive olive dye on cotton cloth, as indelible as marking ink, for which it may be substituted. I may shortly have it in my power to exhibit to the Society some specimens which I expect from India of bricks of half-stuff, or of such materials as we have now under consideration.

*In the event of employing such fibres as the plantain leaf stalk, a small pair of hard wood grooved rollers, such as they employ for squeezing sugar cane would be very useful; their cost is two shillings.

We now come to consider the very important head of price, or the rate at which supplies of paper half-stuff might be imported from India, referring more especially to Calcutta, where probably the best grand centre for such an operation would be found. Reviewing the subject from a knowledge of its general character and elements, I am of opinion that contracts could be made, according to the ordinary usages of the country, with the middle men, village dulals or brokers, at the rate of from one rupee eight anas, or three shillings, to two rupees eight anas, or five shillings per maund of 82lbs., deliverable at any central depot within a radius of twenty miles. These prices are equal to from about 4*l.* 4s. to 7*l.* a ton.

The charges of collection, transport to Calcutta, warehousing, packing, and shipping, &c., I estimate at two pounds per ton.

The charges to London, including freight, insurance, exchange, dock, and in fact all commercial charges, I estimate at £7 per ton weight. It is necessary to specify the ton weight, as the ton for freight would be only 16 cwt.

I have assumed the charge for freight at the full average rate for ordinary times of peace, or £3 10s. per ton of 16 cwt. The present rate for that item would at once amount to £7 or £7 10. A summary of the above costs and charges gives us for the lowest-price materials:—

	£	s.	d.
Cost per ton	4	4	0
Charges in the country . . .	2	0	0
Freight and charges to London .	7	0	0
Total	£13	4	0

And for the more expensive limit, which would probably include articles equal to linen rags:

	£	s.	d.
Cost per ton	7	0	0
Charges in the country about .	2	2	0
Freight and charges to London .	7	3	0
	£16	5	0

It may be useful to offer a few words on the subject of the organization necessary to be given for collecting such materials on an extensive scale in India. On this head I have to observe that it would be necessary to have recourse to the usual Indian system of making cash advances to contractors ere a pound of the goods had any existence. Such, however, is the universal custom of the country, and one which it would be almost impracticable to deviate from. The Government itself advances to its contractors about one-third of the amount of contract. Indigo planters, silk collectors, having frequently ranges of country extending over sixty miles, carry on their transactions under this system, and, if it have its bad points, on the other hand it has some very important advantages. The natives, from ages of custom, expect this assistance from their employers, and it must be admitted, are wonderfully faithful on the whole in adhering to their bargains. They live on from year to year, prematurely eating the produce of their labour, and under the system become steady, industrious, and contented labourers. The wealthiest portions of these vast countries are those where European capital or intelligence has penetrated for the production of the various staples of Indian commerce. There are losses from deaths and defalcations which form a charge on the operation, but experience proves that it has not annihilated any branch of trade which comes within its influence.

I might extend this subject much further, but I shall have fulfilled what I proposed to myself in addressing you, if I have succeeded in fixing attention on what I believe will be found to be the proper direction to be given to any efforts which may be made for obtaining from India extensive supplies of low-priced raw materials for the important manufacture in question. To recapitulate, the method I have suggested is applicable to whole regions of country now teaming with an intelligent and industrious population, inasmuch as it proposes to avail itself at once of their own simple arts; it brings the question as near as possible to the state of a domestic industry, ever the most economical in such countries; it reduces to the lowest point the charge of collecting from extensive districts the various elementary matters which might present themselves. European machinery and methods could only be employed advantageously in localities where refuse or very low-priced materials presented themselves in considerable quantities within a moderate radius. In reference to plaintain or banana fibre, these conditions would be found in the neighbourhood of Madras or Calcutta, or other large Indian towns. Alluding to Calcutta, it is probable that the refuse of the consumption of the fruit in question by a million and a-half of people might be concentrated in that locality on very econonomical terms, aided by the immense network of rivers and nullahs with which that city is connected, affording cheap and easy communication.

To remove the paper duty at this present epoch would afford but little assistance either to the manufacturer or the public, inasmuch as, the supply of raw materials being a fixed quantity at this moment, any remission of duty would pass over as a simple bonus to the rag collectors—a very uncalled-for gift, and to the positive detriment of the revenue at a very inconvenient time. With the immense resources which this country possesses in her tropical dependencies, more especially India, she should have the supply of the world with paper as she has of other manufactures, instead of being undersold; but new ground must be opened, and the proper direction should be—India.

T. F. HENLEY.

81, Cambridge st., Pimlico, May 20, 1854.

UNIT OF WEIGHT FOR A DECIMAL NOTATION.

Sir,—In my communication on the Decimal Notation of Money, to which you kindly gave insertion in your number of the 19th of May, I suggested a certain quantity of silver to be fixed on as the "coin" of account, the adoption of which would render unnecessary any immediate change in our present currency, while it would not disturb in the slightest degree the prevailing notions of value.

Now it is found that a cubic foot of water weighs 1000 ounces avoirdupois; consequently the tenth of a foot cubed weighs one ounce, of which the weight (1¾ grains) of the proposed silver "coin" is exactly the 250th part. By making this the standard unit of weight, 1000 "weights" will of course be equivalent to 4 ounces, and 4000 to a pound. Thus a decimal notation may be introduced which will not require the sudden abrogation of the popular terms "pound" and "ounce;" reduction between the present and proposed systems not presenting the smallest difficulty.

Let the government only begin by establishing an improved *notation*, and the people will of themselves ere long perceive the advantages and necessity of a more convenient system of coinage, weights, and measures.

I am, Sir.
Your obedient Servant,
SAMUEL A. GOOD.

Her Majesty's Dockyard, Pembroke-Dock,
May 31st, 1854.

Proceedings of Institutions.

HUDDERSFIELD.—The spacious saloon of the Mechanics' Institution was more than usually crowded on Saturday last, being the evening for the monthly meeting. An address was delivered by the Secretary, Mr. Frank Curzon, on "Music, the Educator," which was preceded and followed by some excellent singing, by the Huddersfield

glee club, Messrs. Hirst, Netherwood, Etchells, and Hoyle. Mr. Longley presided at the piano, and Miss Whitham, who is becoming popular as a songstress, gave some solos very effectively. Mr. Curzon, in his address, directed the attention of the audience to the Institution of cheap and good concerts for the working classes; and from the sympathy manifested by all present in the idea which the speaker threw out, it is probable that some practical result will speedily follow.

To Correspondents.

Letters from Mr. H. Reid, on "Mechanics' Institute Classes;" and from Mr. W. Miller, on "Decimalization of Coins and Accounts," are necessarily omitted through want of space.

Errata in Mr. Franklin's letter on Decimalization of Coins and Accounts.—Page 471, in third paragraph, first line, for £900.84, &c., read £900.48, &c.; and in last paragraph but one, for the fraction $\frac{840}{186449}$, read $\frac{840}{864489}$.

MEETINGS FOR THE ENSUING WEEK.

Mon. Royal Inst., 2.—General Monthly Meeting.
Chemical, 8.
Entomological, 8.
Inst. Brit. Architects, 8.—Mr. G. R. Burnell, "On the Effect of some External Agents on Building Materials."

Tues. Royal Inst., 3.—Prof. J. Tyndall, "Vibrations of Heated Bodies."
Linnæan, 8.

Wed. Royal Botanic, 3½.—Promenade.
Society of Arts, 8.—Dr. T. King Chambers, "Industrial Pathology, or the Injuries and Diseases Incident to Industrial Occupations."
Geological, 8.—1. Prof. Owen, "On Fossil Mammalia and Reptilia from the Purbecks of Durdlestone Bay." 2. Mr. W. Blandford "On a Section Exposed in the Excavation of the West India Docks." 3. Mr. J. Prestwich, "On the Palæontological and Physical Distinctions of the London Clay and the Brecklesham Series." 4. Mr. J. Prestwich, "On the Relation of the London with the Lower Tertiaries of France and Belgium."

Thurs. Royal Inst., 3.—Mr. M. T. Masters, "On Botany."

Fri. Astronomical, 8.
Philological, 8.
Architectural Assoc., 8.—Class of Design.
Royal Inst, 8½.—Prof. Faraday, "Magnetic Hypotheses."

Sat. Asiatic, 2.
Royal Inst., 3.—Dr. W. B. Hodgson, "On the Importance of the Study of Economic Science as a Branch of Education for all Classes."
Royal Botanic, 3¾.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 25th May, 1854.

Par. Numb.
180. Metropolis Drainage—Plans.
237. Sugar, &c.—Return.
248. Foreign Sugar—Account.
258. Small Arms—Report, Minutes of Evidence, &c.
106. Bills—Valuation of Lands (Scotland) as amended in Committee, and on re commitment.
109. Bills—Benefices Augmentation.
110. Bills—Church Rates Abolition.
111. Bills—Income Tax (No. 2).
Public General Acts—Cap. 7, 8, 9, 10, 11, 12, 13, and 14.

Delivered on 26th May, 1854.

44. Local Acts (No. 56, Drainage of Lands; No. 57, Londonderry Port)—Reports from the Admiralty.
135. Superannuations (Public Departments)—Accounts.
235. Cholera (Jamaica)—Return.
261. Education (Ireland)—Annual Report of the Commissioners.
Metropolitan Water Companies—Reports.
Military Aid to Turkey—Treaty between her Majesty, the Emperor of the French, and the Sultan.
Joint Capture—Convention between her Majesty and the Emperor of the French.

Delivered on 27th and 29th May, 1854.

209. Carrickmacross National Schools—Return.
234. County Courts—Return.
247. China Expedition—Correspondence.
252. Dowie's Patent Boots—Correspondence.
260. Hay Contracts—Abstract of Correspondence.
265. Education (Expenditure of Grants)—Statement.
268. Parliamentary Papers (Post-office Regulations)—Return.
270. Ventilation of the House—2nd Report from the Committee.
271. Naval Prizes—Copy of Despatch of Vice-Admiral Dundas.
245. Savings Banks—Return (Part 1).
264. Revenue Departments—Estimates.
102. Bills—Married Women.
112. Bills—Courts of Common Law (Ireland).
93. Bills—Exchequer Bonds.
113. Bills—Stamp Duties.
115. Bills—Custom Duties (Sugar).
Public Records—15th Report of the Deputy-keeper.
Railways—Reports upon Certain Accidents.
New Zealand—Further Papers.

Delivered on 30th May, 1854.

228. Fire Insurances—Account.
232. Greenwich Hospital—Accounts.
253. Criminal Prosecutions—Abstract of Return.
257. Greenwich Hospital, &c.—Return.
263. Agricultural Statistics—Supplementary Report.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, May 26th*, 1854.]

Dated 1st March, 1854.
500. S. Roussell, 67, Rue Caumartin, Paris—Painting glass.

Dated 8th March, 1854.
554. L. J. Barnetche, M.D., Bordeaux—Prevention of accidents on railways.

Dated 9th March, 1854.
562. J. Smith, Liverpool—Baking ovens.

Dated 17th March, 1854.
638. T. J. Herapath, Bristol—Manures.

Dated 27th March, 1854.
710. G. Collier, Halifax, Looms.

Dated 8th April, 1854.
827. J. Platt, Oldham—Cotton machinery.

Dated 11th April, 1854.
850. T. S. Whitworth, Salford—Spinning machinery.

Dated 18th April, 1854.
892. J. Rowley, Camberwell—Substitute for leather.

Dated 2nd May, 1854.
986. R. J. Mary'on, 37, York road, Lambeth—Anchors.

Dated 4th May, 1854.
998. C. Mee, Bath—Foundation for ornamental designs.
1000. C. Barlow, 89, Chancery lane—Water meters. (A communication.)
1002. J. Manley, Chacewater—Mine ventilation.

Dated 5th May, 1854.
1004. W. Exall, Reading—Machines for cutting straw.
1006. E. Haseler, Wolverhampton—Ornamenting metals, papier maché, &c.
1008. A. M. P. Barbette, Paris—Brass-topped nails.
1010. A. Warner, 11, New Broad street—Metal sheets for sheathing.

Dated 6th May, 1854.
1022. J. H. Johnson, 47, Lincoln's inn fields—Railway carriages. (A communication.)
1024. J. Bernard, Club chambers, Regent street—Stitching machinery.

Dated 8th May, 1854.
1028. G. F. Logan, Glasgow—Templates.

Dated 9th May, 1854.
1034. F. P. Berquez, Richmond road, Dalston—Gas stoves.
1036. C. Liddell, Abingdon street—Permanent way.
1038. E. N. Horsford, Massachusetts, U.S.—Removal of chlorine.

Dated 10th May, 1854.
1040. P. A. Sparre, Salisbury street, Strand—Preventing alteration of written documents.
1042. R. Reece, Athy—Smelting iron.
1044. J. Anthony and W. T. Chafe, Devonport—Pipes and tubes.

Dated 11th May, 1854.
1048. E. Brown, Sheffield—Scissors.
1050. J. Cundy, Carrington, Nottingham—Reflectors for artificial light.
1052. H. Doulton, High street, Lambeth—Kilns for baking earthenware.
1054. E. W. Abbott, Regent's quadrant—Umbrellas and parasols.

Dated 13th May, 1854.
1072. E. Barsanti and F. Matteuci, Florence—Motive power by explosion of gases.
1074. C. Garforth, Dunkinfield—Permanent way.
1076. P. G. Shaw, Old Broad street—Decanting liquids.
1078. Capt. H. Y. D. Scott, R.E., Woolwich—Cement.

APPLICATION WITH COMPLETE SPECIFICATION FILED.

1153. J. Cox, Birmingham—Percussion caps. May 23rd, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed May 25th, 1854.

2748. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in the production of printing surfaces. (A communication.)

Sealed May 26th, 1854.

2755. Joseph Wormald, of Vauxhall, and George Pollard, of York road, Lambeth—Improved pipe wrench.
2762. Louis Cornides, of 4, Trafalgar square, Charing cross—Combining gelatine with certain other substances, and coloring the same, so as to produce various objects capable of resisting atmospheric influences.
2769. Robert Hawkins Nicholls, of Bedford—Improvements in hoeing and otherwise cultivating land.
2772. Alexander Macomie, of No. 6, Percy street, Rathbone place—Ornamental piece of furniture shaped like a vase, constructed to contain or form a writing and drawing desk.
2775. Patrick Kelly, of No. 111, West street, Drogheda—Improved apparatus for cultivating, preparing, and treating land, and for sowing seeds.
2778. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in fire-arms.
2784. Edward Keating Davis, of No. 1, Howley street, Lambeth—Improvements in machinery for making pipes, sheets, still worms, and other articles from that class of metals called soft metals, as lead, tin, zinc, bismuth, or alloys of soft metals, that are capable of being forced out of metal receivers or chambers through dies, cores, &c.
2793. Thomas Garnett, of Low moor, near Clitheroe, and Daniel Adamson, of Dukinfield—Improvements in generating steam and in consuming smoke.
2799. John Henry Johnson, of 47, Lincoln's inn fields—Certain applications of vulcanized India-rubber. (A communication.)
2820. Squier Cheavin, of Spalding—Double action or belt filterer.
2828. Edward Oldfield, of Salford—Improvements in machinery for spinning and doubling.
2876. Allan Macpherson, of Brussels—Improvements in disinfecting sewers or other drains or depositaries of fetid matters or gases, and in converting the contents thereof to useful purposes.
2879. Hippolyte Laurent Du Bost, of No. 62, Rue Neuve des Petits Champs à Paris—Improvements in the construction of locks and keys.
2885. Edward Orange Wildman Whitehouse, of Brighton—Improvements in effecting telegraphic communications.
2888. William Redgrave, of Croxley green, Rickmansworth—Improved safety travelling cap.
2898. Edward Beanes, of No. 57, Charlotte street, Portland place—Improvements in the manufacture and refining of sugar.
2912. Jean Baptiste Pascal, of Lyons—Improvements in obtaining motive power.
2934. Andrew Lawson Knox, of Glasgow—Improvements in ornamenting certain descriptions of textile fabrics.
2968. Heiman Kohnstamm, of 7, Union court, Old Broad street—Improvements in the manufacture of imitation leather.
2977. Charles Lewis, of Hull—Improved lamp for signalling.
9. Joseph Madeley, of Walsall—Improvement or improvements in the manufacture of certain kinds of tubes, and in nuts for and heads of screws.
83. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvement in the manufacture of glass.
167. John Westlake, of Totnes—Pulverizing, washing, separating, amalgamating, and otherwise treating ores, gossans, earths, and rocks, so as the better to obtain and extract therefrom the gold and other metals and minerals which may be contained therein.
290. Peter Armand le Comte de Fontaine Moreau, of 4, South street, Finsbury—Arrangements for preventing accidents on railways.
397. William Henry Barlow, of Derby—Improvements in securing and connecting the rails of railways.
428. Edward Massey, of 3, Tysoe street, Clerkenwell—Improvements in ships' logs, known as "Massey's patent ships' logs."
457. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in engines for generating power, by means of the expansive force derived from heated air and gases, or by means of the expansive force of liquid carbonic acid, and other expansible liquids.
702. Thomas John Smith and Joseph Smith, both of Queen street, Cheapside—Improvements in the manufacture or construction of pocket books, portfolios, and similar articles.
709. James Alexander Manning, of the Inner Temple—Improvements in the treating of sewerage.
752. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in printing fabrics, and in the machinery or apparatus employed therein.

Sealed May 30th, 1854.

2532. Thomas Sanders Bale, of Cauldron-place, and Daniel Lucas, of Stoke-upon-Trent—Improvements in ornamenting the materials of and articles manufactured in pottery, as bricks, tiles, slabs, &c., and also in glass, slate, stone, and other plastic substances.
2652. John Riddle Musgrave, Robert Musgrave, and James Musgrave, of Belfast—Improvements in hot air stoves.
2781. Joshua Jackson, of Wolverhampton—Improved signalling apparatus.
2785. John Hewitt, of Salford—Improvements in machinery or apparatus for spinning cotton and other fibrous substances.
2787. Richard Balderstone, of Blackburn—Improvements applicable to spinning machines known as 'mules,' and to machines of similar character, for clearing or cleaning certain parts of such machines.'
2790. Lewis Jennings, of Fludyer-street, Westminster—Improved mode of producing plain and ornamental sewing, and in machinery applicable thereto.
2816. William Dray, of Swan-lane—Improvements in the construction of portable houses and buildings.
2872. John Bourne, of Port Glasgow—Improvements in steam engines.
2873. John Bourne, of Port Glasgow—Improvements in machinery for the production of iron ships and other similar structures.
2874. John Bourne, of Port Glasgow—Improvements in the construction of iron ships.
2889. George Kerr Hannay, at Ulverston—Combination and manufacture of composition grinding wheels, hones, and other grinding bodies.
36. Alfred Vincent Newton, 66, Chancery lane—Improvements in the construction of motive power engines, part of which improvements is also applicable to the packing of pistons generally.
111. Henry Corlett, of Summer-hill, Dublin—Improvements in springs for railway and other carriages and vehicles.
123. Robert Galloway, of Lambeth—Improvement in admitting air to furnaces where tubular boilers are employed.
126. George Henry Bursill, of Offord-road, Barnsbury-park—Improvements in operating upon metalliferous ores and other minerals, and upon 'slags' and 'sweep,' in order to facilitate the separation and recovery of the metals and other products; also in machinery or apparatus for effecting such improvements, which is in part applicable to other purposes.
219. Peter Armand le Comte de Fontaine Moreau, of 4, South-street, Finsbury—Improved means of preventing accidents on railways.
387. Ellis Rowland and James Rowland, of Wakefield-street, Manchester—Improvements in cleaning the tubular flues of steam boilers.
431. James Boydell, of 65, Gloucester-crescent, Regent's-park—Improvements in applying apparatus to carriages to facilitate the draft.
631. Frederick William Emerson, of Trereiffe Chemical Works, near Penzance—Improvements in machinery for pulverizing, washing, and amalgamating quartz and matters containing gold and silver.
663. James Young, of East Smithfield—Improvements in brewing.
679. William Dinsley Skelton, of Leeds—Improvements for preparing flax for spinning.
680. Robert Owen White, of Swanscombe—Improvements in the manufacture of Portland cement.
689. Stephen Holman, of Colney Hatch—Improvements in machinery for raising and forcing fluids; part of which improvements is also applicable to the guiding of piston rods generally, and other rods.
729. Elmer Townsend, of Massachusetts (U.S.)—Improvement in machinery for sewing cloth or other material. (A communication.)
756. George Fergusson Wilson, of Belmont, Vauxhall, and William Walls, of Glasgow—Improvement in dyeing Turkey red.
882. Henry Kemp, of Creekmoor, Poole—Improvement in the preparation of wood for planking and sheathing ships and other vessels, also in house, ship, and pier building, railway sleepers, &c., and all other purposes whatsoever where wood is required
870. William Ridgway, of Hanley—Improvements in the construction of ovens and kilns.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
May 25.	3595	The Josephine Glove	Foster, Porter and Co.	Wood street, Cheapside.
" 26.	3596	The Safety Promeneur Carriages	Thomas Trotman	Gloucester place, Camden town.

Journal of the Society of Arts.

FRIDAY, JUNE 9, 1854.

EDUCATIONAL EXHIBITION.

The time limited for applications for space having now passed, the Committee are at once proceeding to allot the space to the different Exhibitors, notice of which will be forthwith sent to each.

The applications have been extremely numerous, and there is no reason to doubt but that a very large and valuable collection will be got together, and that St. Martin's Hall will be filled to overflowing. The Society is now organising a series of Lectures, to take place, during the Exhibition, upon the subject of education generally, as well as upon the various articles which will be exhibited. Commissioners have been appointed by different governments on the Continent and in the United States of America, to attend the Exhibition, which will thus take the character of a Great Educational Congress.

The Lords Commissioners of her Majesty's Treasury, have given directions for the admission, duty free, of articles coming from foreign countries and intended for this Exhibition, under such regulations as the Commissioners of Customs may think it advisable to make.

The Council of the Society of Arts solicits attention to the intended Educational Exhibition at St. Martin's Hall, in June next.

To give full development to this undertaking, to procure the co-operation, not only of the great Educational Societies and Institutions at home, but also in the Colonies and the Continental States, and to illustrate it by Lectures, with practical discussions, a considerable outlay must be incurred.

The Council deems it a duty to secure the funds of the Society from an expenditure which would interfere with its ordinary proceedings, and therefore invites the cooperation of the Members of the Society and of other friends of Education.

The following subscriptions have been already received :

	£.	s.	d.
H.R.H. Prince Albert, President	100	0	0
Amount of subscriptions already published, including that of H.R.H.	677	18	0
FIFTH LIST.			
W. Farr, M.D.	2	0	0
George Courtauld	3	3	0
Henry Harvey	1	1	0
John Proctor	5	5	0
W. Roberts	1	0	0
R. A. Slaney	5	0	0

Erratum in Fourth List, for *J. Bull*, read *J. Ball*.

LEGAL POSITION OF INSTITUTES.

Mr. Hutt, one of the Vice-Presidents of the Society, has kindly taken charge of the Bill prepared by the Council respecting the legal position of Institutes, and it was brought into the House of Commons and read a first time on Friday last. The title is "A Bill to afford greater facilities for the establishment of Institutions for the Promotion of Literature, Science, and the Fine Arts, and to provide for their better regulation."

The Bill consists of thirty-nine clauses. It has for its object the enabling persons whether entitled in fee simple or to limited interests only in land, corporations, and public bodies, to convey by way of gift, sale, or otherwise, land not exceeding in quantity an acre, as a site for an institution. Power is also given for the conveyance of the lands of infants and incapacitated persons for the like purposes, and a simple form of grant is provided in the Bill. Any number of sites may be granted, provided they are for separate Institutions. When the Institution is not incorporated, the Bill provides that the site may be conveyed to any corporation as a trustee in its behalf, or to individual trustees; and in the latter case, the provisions of 13 and 14 Vict., c. 28, are made applicable, by which new conveyances on the appointment of new trustees, are rendered unnecessary. Stamp duty on conveyance by way of gift to be 5s., and the death of the grantee within twelve months shall not invalidate the grant. The Bill then provides for the application of the purchase money in different cases, and certain clauses of the "Lands Clauses Consolidation Act, 1845," are made applicable. Trustees of Institutions to have power to sell or exchange lands or buildings, or to let off the same in portions. Trustees to be indemnified from all charges in respect of the land, and, if made liable, to have power to mortgage or sell the premises to indemnify themselves. The Bill then proceeds to provide that in incorporated Institutions having no special provision as to personal property, and in all other cases where the Institution is not incorporated, the personal property of the Institution shall be vested in the governing body for the time being and in all proceedings, civil and criminal, may be described as the property of the governing body. Institutions may sue and be sued in the name of the corporation, when incorporated, and, when not incorporated, in the name of the public officer. Institutions to have power to make bye-laws and enforce them, with an appeal on the part of any member to the Charity Commissioners against any bye-law. Members to be liable to be sued as strangers. Members guilty of criminal acts to be punishable as strangers. Institutions to have power to extend or abridge their purposes, with an appeal on the part of any member to the Charity Commissioners. Provision is made for the dissolution of Institutions and winding up their affairs.

TWENTY-FIFTH ORDINARY MEETING.

WEDNESDAY, JUNE 7, 1854.

The Twenty-fifth and last Ordinary Meeting of the One Hundredth Session, was held on Wednesday, the 7th instant, HARRY CHESTER, Esq., Chairman of the Council, in the chair.

The following candidates were balloted for and duly elected Ordinary Members:—

Castle, Henry James	Ramsden, Sir John William, Bart., M.P.
Goddard, Ebenezer	Ruston, Rev. James, M.A.
McDouall, Colonel	Tripp, James S.
Moody, Rev. Clement, M.A.	
Robinson, Henry Oliver	

Previous to the reading of the Paper, the Secretary called attention to a model of Mr. C. J. Redpath's Smoke-Consuming Furnace, the idea of which was partly derived from Mr. C. W. Williams's Argand Furnace. The air was introduced through the outer plate of the furnace-door, which was perforated for the purpose, and it then passed upwards into an air-box above the fire, from which it descended in a heated state into the fire, causing the most perfect combustion of the fuel. Opposite the air-box before alluded to there was a valve, which could be opened and shut at pleasure, to admit air directly to the fire without passing between the plates of the furnace-

door. When fresh coal was added to the fire, and a large quantity of air was required, this valve was opened; as soon as the charge had become ignited the valve was closed. The cold air continually impinging on the inner plate of the furnace-door, kept both it and the ash-pit cool, which was a great consideration on board steam-vessels. It also prevented the rapid deterioration of the door. The furnace-bars were not more than three-quarters of an inch thick by six inches deep, and were placed half an inch apart; they were grooved on the top, thus making the set corrugated, offering a broken surface to the fuel, and thereby less inclination to clinker. This furnace could be applied to any boiler at a comparatively small cost, and in a short space of time. The expense of fitting it to a 30 h. p. boiler, including brickwork, furnace-bars, &c., would be about £30. It might be seen in operation at Messrs. Wackerbarth's, the sugar refiners, and also at the Lea Cut Iron Works.

The first Paper read was

INDUSTRIAL PATHOLOGY; OR THE ACCIDENTS AND DISEASES INCIDENT TO INDUSTRIAL OCCUPATIONS.

By T. K. Chambers, M.D.

I come to this room to-day for the purpose of introducing a subject, not indeed wholly new to the Society of Arts, but yet probably new to most of the present members. New, too, is the mode adopted of taking it up, namely, the appointment of a special committee, the undertaking of a special exhibition, and the issue of special circulars and reports upon it. I think, therefore, it cannot be devoid of use, and I hope not of interest either, to explain somewhat at length, *what Industrial Pathology is*, that is, what its aims are in the opinion of those who are taking a part in its promotion; *why the Society of Arts should concern themselves with it*; and *what the Council propose to do in the matter*.

Industrial Pathology then—(I do not particularly admire the name, but I did not make it)—Industrial Pathology is the "science of bodily SUFFERINGS connected with the carrying on of handicraft work."

Man's Creator ordained that he should eat bread in the "sweat of his brow," but he did not ordain that he should eat it in suffering, in the rotting of his vitals, the periling of his soul, and the welcoming of premature death. Though labour is the lot of our species, it is healthy, invigorating labour which is natural to them, and not that which entails misery and pain.

The highest and most natural state of man being the greatest perfection of body and soul, any occupation which tends to shorten his days, to make him a discomfort to himself and his neighbours, is unnatural, and a proof of barbarism and defective civilisation. Every country where such occupations exist is lower than it might be in the social scale,—has not yet done its utmost to place man in his proper position as king of the world. As long as he that toils with the hands has a life shorter and more physically painful than he that toils with his brain, the duty of self-improvement is unperformed by a people.

It is not necessary for me to observe that such is the case now in every known nation—that the corporeal labourers are both shorter lived and endure more physical evils than the mental labourers. Statisticians are explicit enough on that point. Now it will be found on enquiry that there are two distinct classes of evils to account for this. In the first class are included poverty, ignorance, political weakness, and other circumstances which prevent handicraftsmen surrounding themselves with the defences against pain and death placed in the power of their superiors. These causes it is the business of Political Economy, State Hygiene, and the science of Education to investigate and teach us how to remedy. But there is also a class of causes arising out of the nature of various descriptions of bodily exposure and exertion; pain, sickness, and death, accrue from some things necessarily part of the work, without doing which the man could not be industrious at his trade. Here lies the field for Industrial Pathology. The first class of evils depend mainly on the work not being sufficiently regular or plentiful, or being under-paid, or some such economical mis-management; the second is aggravated by abundance; the more a man has to do the worse he fares, and hence the propriety of the term "Industrial." I will illustrate this. There are two coal-whippers at a time of a commercial crisis in the coal trade; fewer hands are wanted; one gets turned out of work, and the other is kept on. In six months time the one out of work is starving, because he was so weakened by temporary want of food that he was not fit for employment when he could get it. It is the business of the political economist to remedy commercial crises. The other man has worked as hard as possible in the way you know these fellows are engaged, jumping up a foot or two and throwing their whole weight on to a rope for ten or twelve hours a day; it is I believe the most wasteful, unscientific, and pernicious expenditure of human muscle that ever was devised. The consequence is that his heart cannot stand it, the fibres are overstrained with these continued violent jerks, and the organ becomes diseased. After a tedious illness, during which he is an incumbrance and expense to society, the industrious, well-paid man dies at forty. Here it is that Industrial Pathology comes into play. It is the duty of that science to find out *why* such and such labour is injurious in a special manner, and to suggest a remedy. For example, in the instance quoted above, we may find out that it is the sudden jerk which is the cause of the injury to the circulation, and devise some better mechanism than is at present in use.

Again, painters are liable to colic and palsy from the use of white lead; we may introduce a substance equally convenient, in the shape of white zinc or other substitutes.

Tailors sit all day in a confined atmosphere, with the legs crossed and the spine bowed, so that neither the ribs nor the digestive organs have room to act. The consequence of course is that the stomach and bowels become disordered, the spine twisted, the gait shambling, and the power of taking the exercise necessary to health obliterated. If an artist wants to represent a starveling, he takes a tailor as his model; if a plump rosy man were to tell you he was a journeyman tailor, you would not allow such an evidently inexperienced workman to mend your coat. With a life embittered by indigestion, what wonder that a tailor takes to opium, gin, and tobacco, the only things that make existence endurable. Now cannot these evils be corrected? The cross-legged position is assumed because in the ordinary sitting posture the heavy cloth could not be held near enough to the eye. The problem is to invent some sort of table which would be equally convenient.

Shoe-makers and boot makers suffer equally from a constrained position, and also from the pressure of the last against the stomach. Heartburn and painful digestion are so common, that a certain pill in the Pharmacopeia (the *Pilula Sagapeni Comp.*) is called the coblers' pill. A patient of mine, now in St. Mary's Hospital, has a hollow big enough to put one's fist in, from the pressure inwards of the breast bone by the boot-tree; of course his lungs and heart are diseased by such distortion. Cannot some one devise a new sort of boot-tree, which will not drive its tap roots into people's lungs?

Looking-glass makers and water-gilders are constantly coming into hospitals for mercurial paralysis; and when they go out of the hospital they are not fit for much else

than the workhouse. There are two ways of remedying this: one is to give them some protection against the poisonous fumes; and the other is to improve and cheapen rival modes of gilding and silvering, in which mercury is not used.

Washerwomen constantly suffer from varicose veins and other mechanical disorders arising from the standing posture. It is the business of Industrial Pathology to devise a chair in which they could work as at present, or else to discover some mode of doing the same thing by the agency of mechanics, which is now done immediately by the unaided body—to wear out mechanism instead of muscle, iron instead of energy.

I show you here a rotten jaw-bone, which Mr. Simon was obliged to cut out of a man's head because it was corroded by the noxious fumes evolved in the manufacture of lucifer matches. It is to be hoped that there is some mode of making them without rotting men's jaws, and this mode it is the business of Industrial Pathology to find out.

Few persons who walk much in the streets can avoid often meeting a bleeding groaning mass carried by on a stretcher, having just fallen from some ill-made scaffolding. It is the business of Industrial Pathology to enquire, whether it is an essential part of the nature of our countrymen to fall from scaffolding, or whether the construction of it might be so altered as to prevent the accidents. For the encouragement of those who are possessed with the latter idea, it may be cursorily mentioned that in China they have for several thousand years used a light bamboo scaffolding, covering the entire building like a network, and certainly preventing the falls which so often happen in Europe. Our ideas seem to have travelled wholly in the direction of making it stronger, heavier, and more unmanageable.

I trust that by these few familiar illustrations, I have made clear what Industrial Pathology is, and how it differs from Hygiene. It does not profess to enquire into the health of the industrious classes generally, but only into their health so far as it is affected by their special occupations. It is desirable that this division of labour among scientific observers and teachers should be fully understood, in order that the facts collected should be properly arranged, and handed directly to those who will use them aright. Into the respective utility and consequent dignity of the two sciences I have not enquired: I only wish to point out which it is that the Council feel themselves called upon to take up.

I now come to the reason *why our Society should particularly give time and attention to the subject*. It may be said that the investigation and cure of disease is not their province, nor universal philanthropy their aim. True, the raising man in the scale of creation, by advancing his arts and manufactures, is our vocation, and a great and glorious one it is; but as he that treats his friends to a banquet is responsible that no poisonous matters are in the dishes, so are we responsible for the boon we are conferring on England in increasing her material powers, to see that there is no evil contained in it, no death in the pot of sweet dainties. It would be a scurvy gift to our country to adorn her with more luxurious raiment, while the threads that compose it are the fibres, and the dye that makes it glow, is the blood of her children.

But is there nobody to take this matter off our hands? Is there no man, or set of men, who, while we are pushing on industry, will see that we do no harm? Really, there is not; it is nobody's business but ours, and nobody has the power of doing it so well and so effectually. I do not deny that government may, if rightly directed, afford most useful help in this truly great work of perfecting our country, in the same way as they aided us by the countenance given to the Great Exhibition of 1851. But their province and ours are quite distinct, and they could not take our place any more than we could take theirs without injuring the cause. It is for our rulers to require that certain evils be put a stop to; it is for us to suggest remedies. Parliament does not profess to be an inventive body, nor, except very indirectly, the cause of invention, *but we do*, and in this lies our peculiar aptitude for the task we are now undertaking in earnest. Let us see, as an example of government interference, how they have lately dealt with one most crying evil,—the excessive number of accidents in factories; and then think how the Society of Arts might perform the same duty. There was a great cry heard last autumn. In the three years ending October 31, 1853, there were 11,716 persons mutilated by machinery, of whom 106 were killed on the spot, and the rest had only arms, fingers, legs, and so on, cut off. This was more than ten times the number of accidents which happened in factories by other causes. While the number of machinery mutilations was, as stated above, 11,716, the other accidents were 1028. Alarmed at this, the factory inspectors thought it was time to carry out more strictly than had been hitherto done certain provisions in the Factory Act (7th Victoria), which required a perfectly secure boxing or fencing of machinery. They had observed that of these 4000 annual accidents of various degrees of severity, at least 40 of the most severe kind occurred from horizontal shafts above seven feet from the ground, and which custom did not require to be guarded like those within reach of a man under ordinary circumstances. Custom did not require it, though the strict letter of the law did. With the hope, then, of reducing somewhat at least these forty annual accidents, (which, be it remembered, were not the slighter ones alluded to, but generally fatal,) the inspectors sent round a circular, announcing their intention of requiring strict compliance with the enactment, and that all machinery, whatever its height from the floor, should be boxed. They had the opinions of the best engineers that there was no difficulty at all in this being done. Instantly up comes a deputation of Members of Parliament, magistrates, and all sorts of respectable persons interested in the profits of manufactories; they beseige the Home-office, and show the "impossibility," that is to say the great outlay of capital involved in compliance with the law. What was Her Majesty's Minister to do? Of course decide on the evidence before him, countermand the peremptory circular of the inspectors, and take upon himself the responsibility of rendering the law still dormant. A second circular was issued, making various suggestions for the greater security of the machinery, such as putting up hooks to catch lapping straps, employing only adults in dangerous places, &c., and the test of the effectiveness of these provisions is to be the number of accidents which occur during the current year. But in the mean time not the slightest attempt is made to alter the machinery employed. Suggestions are brought forward to guard the workmen in some degree from its dangerous proximity, but the making the monster itself less fearful is never thought of. This is the object that the Society of Arts would aim at; we would encourage the invention of less injurious machines and modes of manufacture; we would make them public, and enable the executive to say, "No, gentlemen, our orders are *not* incapable of execution; the way to carry them out is shown at the Society of Arts." It is our business *to lead*—it is the business of government *to drive*—to drive those who, longer than human patience can bear it, refuse to be led. But the leading must go first, else the driving will be tyranny. We must serve out the straw before we require the tale of the bricks. Whether it will ever be wise of parliament to forbid many of the noxious modes of handicraft work which I have mentioned, I do not know—but I am sure it would not be wise till the possibility of less injurious modes of attaining the same object can be shown.

I come now to the third question which may be asked concerning Industrial Pathology, viz., *how does the Council propose to be of use in this matter?* This has been in a great measure answered by a circular which has lately been issued, and which was printed in the Journal a few weeks ago. They propose in the first place

to have an Exhibition of contrivances and appliances for making the practice of handicrafts more healthy. What they expect to be sent to the Exhibition are, in short, means for working with less injury to the body than at present. Machinery of all sorts may appear, the express object of which is to guard against the myriads of accidents I spoke of, and save lives in numbers to be calculated statistically. Improved hand-tools will be a very valuable department; adzes which will not divide carpenters' shins, boot-trees which will not obliterate coblers' digestions, &c., may be shown to those most interested in using them. Safer ladders, scaffolding, chairs for window-cleaning, buckets for lowering men into wells, mines, &c., will save multitudes of industrious souls, if the invention of them can be stimulated. Another most important path of discovery is the inventing of substitutes for substances chemically noxious, such as lead, quicksilver, phosphorus, arsenic, the strong mineral acids and alkalies; or modes of rendering their noxious qualities harmless, such, for instance, as fixing the putrid fumes of decaying matters preserved for manure or making leather. Another interesting department will be that of guards for the organs of sense of the individual workman—I mean such as will not interfere at all with present modes of manufacture, but will simply defend the artizan from the injuries it entails. As examples I have placed on the table a few articles referrible to this class sent to us by Mr. Pillischer, of Bond-street. They consist of defences for the *Eyes* against the effect of light, and mechanical injury; and if a third of the contrivances that are furnished to us are as simple and rational as these, we shall indeed be fortunate. Improved dresses for particular occupations may furnish another department.

Defences against injury by animals, such as safer harness, dog muzzles, &c., would prevent many an accident to a domestic servant and working man.

Such are a few examples of the sort of inventions which the Council trust will be sent for exhibition; and, considering the position we hold as the friend—equally and impartially—of master and workman; considering our standing with the public, and our widely-extended connection with the manufacturing classes by means of the Institutes in Union, they have a right to expect many more than they themselves can name or suggest.

I began by saying that the subject of Industrial Pathology was not new to the Society of Arts; and it is a fact that during the early part of this century there was nothing received so much of their attention. Their plan then was to offer premiums for the discovery of definitely-fixed desiderata, and among those announced I find no class more numerous than appliances to guard against the injurious effects of trades. Premiums were not only announced but extensively claimed and bestowed. As an instance of the large scale on which this was done, I will mention the attention given to one limited class, the shoemakers. I find between the years 1804 and 1817, no less than five mechanical contrivances for enabling shoemakers to work standing, and without pressing on the stomach, were rewarded with premiums and engraved in the "Transactions." I may mention, too, that during the present year a most ingenious apparatus has been exhibited in this room by Dr. Stenhouse, for guarding the mouth from chemical fumes, noxious effluvia, and miasmata. It is a layer of charcoal in a respirator, assisted by which you may inhale air saturated with strong ammonia, sulphuretted hydrogen, chlorine, &c., without harm.

But the giving of premiums and engraving in the Transactions does not make these matters sufficiently public to secure them a trial; they cannot be said to have failed, for, I believe, they have not been used by any but the original inventors. Exhibition will afford to the inventor, what he values more than premiums and medals, the opening of a market for his goods—in fact a cheap and strictly honourable mode of advertisement.

I think, too, that an exhibition may be of advantage by connecting this science with that of education. Adult workmen find a difficulty in adopting any new mode of manufacture; they cannot manage new-fangled machines; and, moreover, they can teach their apprentices only in the way they have learned themselves. Now, if into industrial schools improved modes of working could be introduced, more conducive to the health of the artisan, it is clear that a publicity would be given to them which would insure a reception proportioned to their efficiency. As an illustration of this, derived from the same trade I have before mentioned, Mr. Sparks Hall intends to send to the Educational Exhibition a shoemaking machine proposed for use at Industrial Schools, and which will obviate the evils of the present unwholesome fashion of sitting.

Another means of advancing Industrial Pathology which has been adopted is that of inviting from all classes —by means of a general circular—information as to occupations found injurious. This information is intended for the guidance of the Committee and of the Council in their future proceedings.

Thirdly, as a focus of continual advancement, it is proposed also that there should be framed annually, under the superintendance of the Committee, a Report, as detailed and explicit as circumstances will permit, on some one or more special subject or division of Industrial Pathology. One year, for instance, they propose to take up "dusty trades," to collect and arrange information concerning the lives and health of millers, grinders, cotton-spinners, &c. Another year, they may investigate the causes of "falls,"—the breaking of ladders, scaffolding, ropes, and so on. This year, as a beginning, they have invited answers to a circular concerning "injuries to the eyes;" and if one may judge from some of the answers already sent in, a most interesting report may be made upon them. I may mention especially, among communications which have come to hand within the last few days, a very full report from Mr. White Cooper, the well-known ophthalmic surgeon, illustrated with drawings of inventions for defending the eyes; another similar one, containing much additional information, from Mr. Dixon; a paper of statistics from Mr. Hewett, registrar to St. Mary's Hospital; a most interesting paper by a journeyman shoemaker, named Devlin, the suggestions in which are doubly valuable as coming from one who has himself felt the evils; it is on the eye diseases of shoemakers, and I wish I had time to quote some of its original observations. Other working men who have sent answers are glass workers and grinders. We have some valuable matter from Sheffield, about steel grinding. Mr. Cousens, from the north of China, tells us of some habits of Chinese embroideresses, most worthy of imitation. There is a large bundle of others, as yet imperfectly examined, very likely equally valuable; but I think you have here an earnest that the public are ready and willing to make us the mouth-piece of their patriotic communications to one another, and you have heard enough to justify us in proceeding with our plan. We feel sure that the body of information now lying dormant has only to be made public in an energetic and judicious manner, and *acted upon*, to raise the condition of our working classes, and, through them, of our whole country, higher than has ever been deemed possible.

Such, then, are the modes proposed by the Council for helping forward this cause. I do not say others may not be additionally employed; but I do think that from this seed, and with this farming, a crop that will do us credit is to be anticipated.

The second paper read was

ON THE PATHOLOGY OF MINERS.

By Herbert Mackworth, M.Inst.C.E., Government Inspector of Mines.

I may be allowed to express my regret at being unavoidably prevented from being a listener to the important paper of Dr. Chambers on Industrial Pathology, and to thank you for your invitation to me to offer some remarks on a branch of the subject which must send an appeal

home to every philanthropist, but which has in this country been strangely disregarded. The attention of the public is aroused some three or four times a-year to explosions of fire-damp in coal mines, which burn, crush, or suffocate with fiery dust several scores of miners at a time, but little attention is paid to the fatal accidents which occur daily, and by which 1,000 lives are annually sacrificed, without including those unfortunate men who are so far crippled as to die a lingering death. Boys enter the coal mines now at ten years of age. The expectancy of life for the population generally at that age is, by the Carlisle Tables, 49 years. Making allowance for the contingencies of a collier's life, hereafter alluded to, it will be fair to assume that he works for 30 years on an average. It necessarily follows that at least one out of every eight colliers meets with a violent death, and that out of the 250,000 colliers now at work in Great Britain, 30,000 are certain to be killed, unless the present system of working be materially altered. The ratio of deaths by accident in Great Britain per 1,000 colliers is 4.5 per annum, in Lancashire it amounts to 5.2, and in Staffordshire I believe to even more. In the coal mines of Belgium the deaths only amount to 2.8; in Prussia, to 1.6 per annum. I think I have good grounds for stating that this excessive mortality in England is chiefly owing to the almost impossibility of obtaining criminal convictions or civil damages in cases of accidents in mines. The convictions are at the rate of about 1 for 1,000 lives lost, and no compensation has hitherto been recovered by the widows and children of miners under Lord Campbell's Act. Mining accidents are usually difficult to elucidate, and yet the jurymen are generally ignorant persons selected by the constable, often in the employ of the manager; and the coroner and jury seldom or never visit the locality of the accident. Were the methods of inquiry, or of inducing alterations in dangerous mines, more complete, as for instance, in Scotland, the loss of life would be very much checked, a better class of managers would be employed, better systems adopted, and discipline introduced amongst the workmen. The little that has been done in this country and the appointment of the Committees of Parliament who have investigated the causes of explosions of fire-damp, may be traced to Lord Ashley's Commission in 1842, but since then the sanatory question of mines has lain dormant. It was not until I paid a visit to the continental mining districts last year, that I was aware of the extent to which the welfare of the mining class had been studied and improved, or of the astonishment with which continental engineers regarded the sacrifice of life in England, and the apathetic indifference manifested to its continuance. After 40 years' experience in Belgium, of the working of local regulations applicable to one or more collieries, a commission composed of proprietors of collieries, and government engineers drew up in 1850 a code of regulations applicable to all coal mines, and founded not on the right of proprietorship which the government has in the mines but on the ground of public safety. These are now the regulations of safety under which the Belgian collieries are worked. They are almost, if not quite, as applicable to all the coal mines in England. The introduction of similar regulations into England may be difficult, in consequence of the great influence and power of the coal-trade, but it does not appear to be so difficult to place all coal mines to be commenced in future under those restrictions for health and safety which have to a great extent been introduced amongst dwellers on the surface.

The destruction of life from accidents in mines generally is small, however, compared with the injuries and the shortening of life inflicted by the want of sufficient ventilation and other minor causes. The talented gentlemen who reported to Lord Ashley's Commission give nearly the same estimate of the number of years by which life is thus shortened. Several eminent members of the Royal Cornwall Polytechnic Society corroborate these statements by a variety of observations, and so far as can be ascertained from these and such statistics and other means of information which I have had access to, there is every probability that the lives of the miners in the majority of coal mines, in the iron, tin, copper, and lead mines, are shortened from 12 to 15 years on an average, by causes which are in a very great measure removable. In other words, the lives of 300,000 miners are shortened by one-third. I leave to others to consider the scarcity of labour, the rise in wages, the loss to the mining parishes, and the loss to the community at large. One of the commonest drawbacks in mining is the loss of time which occurs from the denseness of the smoke which hangs near a working face after a shot has been fired. Frequently in summer, when ventilation stagnates or reverses, candles will not burn unless held sideways, mines or parts of mines have to be abandoned for days and weeks, and men will sometimes work in the dark. The air is loaded with the products of the decomposition of the timber used in supporting the rock, and of the animal matters in the mine. When horses are used underground, the stable is commonly close to the ingoing air, so that the workmen are each visited in turn by any poisonous exhalations which arise. Mineral substances by spontaneous decomposition give off a variety of gases. Carbonic acid and sulphuretted hydrogen are common, and I have even found incrustations formed of sulphate of zinc an inch thick. These evils may be removed by an increased ventilation, and one which may be readily carried out in any and every mine, whatever be its nature or extent. Those persons who have tried it, and I may instance the managers of a great number of fire-damp mines, are unanimous in agreeing that it may be effected with economy. In some mines, where the ventilation has been improved, the men will acknowledge they can do one-fourth more work. I will give one instance of the effect of ventilation. At the United Mines, in Cornwall, last year, there were three sets of men driving a level at a cost of £17 a fathom; the temperature was 105°, and the men were changed every 5 minutes. I was told that 20 minutes' stay in this air would kill a person. At the request of Mr. Michael Williams, M.P., I visited the mine, and pointed out how a quantity of air might be introduced sufficient to reduce the temperature to 70°, or less. The chief cautions I gave were, to keep the air-course of nearly uniform size, and stop up all leaks by which the air might be lost, before it got into the working face. The temperature has been since reduced to 75°, and the level was costing *5l.*, per fathom instead of *17l.*, when I last heard of it two months ago.

I have endeavoured in my remarks to illustrate the great importance of directing public attention to the pathology of miners; to enter into particulars of the kinds of accidents or diseases would be trespassing on your time on the present occasion. I shall have great satisfaction in following the path marked out by Dr. Chambers and the Committee in their Report to the Society, as I feel that the best and most legitimate way of effecting improvements is to enlist the interest, sympathy and support of public opinion.

DISCUSSION.

Mr. JOHN SIMON, who rose at the invitation of the chairman, said, he was not prepared to make any lengthened observations on the subject, but he was glad to have the opportunity of expressing his deep obligations to Dr. Chambers, for the very admirable paper he had laid before them. In looking over the papers sent in, in answer to the Circular issued by the Industrial Pathology Committee, two facts had strongly presented themselves to his mind, the heavy responsibility that rested upon them, to endeavour to discover the causes of the various diseases alluded to, and the large amount of suffering and misery which existed through the non-adoption of remedies which were immediately at hand for some of those diseases. For instance, on the subject of the eyesight, Mr. Dixon, than whom there was probably no gentleman in the country better qualified

to give an opinion, spoke of the blindness of compositors, caused by the unsteadiness of the light by which they worked. Now that was in a great measure caused by the want of chimnies to their lamps—a want which could be remedied for sixpence. It therefore appeared to him something quite monstrous and inconsistent with common sense, that they were not universally adopted. He felt that the Society of Arts had very properly taken up the subject, for he was sure, when compositors knew what was the cause of their blindness, and how easy was the remedy—they would not run the risk of being reduced to penury and pauperism by the want of chimnies to their lamps. There was another matter which had struck him during the reading of Dr. Chambers' paper, when he alluded to that ugly jaw-bone which had once belonged to a maker of lucifer matches. He was sure that few persons knew the dangers to which such persons were exposed, and that it was only for the Society to call attention to them for remedies to be found. He was not prepared to state what were the remedies for the destructive disease caused by phosphorous, but he might observe that there had lately been discovered a trifling chemical modification of it, called allotropic phosphorous, which answered most of the purposes of the genuine article, and would not affect the jaws as the more volatile matter did. The course the Society of Arts proposed to take in diffusing information with regard to these evils must do a great deal of good, as he felt assured that, were the special diseases of artisans generally known, remedies for many of them would at once be suggested.

Mr. White Cooper had had but too many opportunities of seeing the sad effects arising from the abuse of the eyes among the working classes; the unsteadiness of the lights which had been alluded to, was one, but by no means the only cause of the injurious effects of artificial light upon the eyes; natural light—the light of day—was composed of red, yellow, and blue rays in definite proportions (that was, red 5, yellow 3, blue 8), whereas artificial light always exhibited a greater or less preponderance of the red and yellow, the rays which were most stimulating and most injurious to the eyes. This, however, might be easily overcome by simple contrivances, to absorb the pernicious rays, or improve the light by adding those which were deficient. Glass chimnies for lamps might with advantage be tinged of a pale blue; shades to surround the lights might be coloured on the inner side with the same hue, but this should always be 'flat,' not brightly varnished, as was generally the case, whereby an excess of light causing glare was reflected down upon the object. Again, the rays from the lamp might be advantageously passed through water tinged with pale blue (ammoniuret of copper being the proper colouring material), for certain descriptions of work, as wood engraving, by which means the colour of the light would be improved, and much of the heat arrested. Again, much of the injury to the eyes of those who worked by artificial light arose from the bad position of the lights, which in a great majority of instances were placed in front of the eyes. This was the worst possible position, for the eyes were then exposed not only to the full glare but to the heat flowing from the flames. A very simple arrangement would amend this. The lights should always be so placed that the objects to be discerned could be thoroughly illuminated, but the eyes kept in the shade, which could be managed by having the light placed either above the head, or, better still, rather behind and a little to one side; the eyes would then be perfectly protected, and the amount of comfort obtained by the alteration very great. Such points as had been mentioned might appear comparatively trifling, but in reality they were of grave importance, and general attention to them would benefit not only the working classes but all who had occasion to use their eyes much. He would not detain the meeting by offering any further observations, but he must express his opinion that the enquiry set on foot by the Society of Arts could not be too highly estimated, and no doubt many would be found who would enlighten the community with the results of their experience.

Mr. G. F. Wilson feared he could add but very little to the information contained in the very able paper that had been read, as in the industrial occupations he was most familiar with there were, happily, no trade diseases. In glue making, and other trades of that class referred to by Dr. Chambers, where injurious smells were given off, he believed that the evil might be greatly lessened, if, instead of in the present open vessels, the manufactures were carried on in closed vessels, furnished with a pipe through which the unwholesome gases should pass into a vessel, in which they were exposed to the action of a small quantity of chlorine or other disinfectants. In connection with what had been said of occupations injurious to the eyes, he might state that some of their boys whom they had had to teach to mould glass with the blow-pipe, suffered in their eyes, until blue spectacles effectually prevented the bad effect of the glare.

Mr. Hugo Reid bore testimony to the extreme value of the subject brought under their notice by Dr. Chambers, and the strong necessity which existed for their doing all in their power to improve the condition of the workman. There was one class of labourers, however, to whose position he wished particularly to direct attention, though their labour was not that of a handicraftsman, nor was it altogether bodily,—he alluded to teachers. They had to labour both mentally and bodily throughout the day, and very often also by night, in rooms which too generally were altogether deficient in ventilation, though they all knew how important that was to health. The consequence was, that teachers were subject to a disease which was well known in some parts of the country as the "parsons' throat," and he knew a case where the medical man declared the patient never could recover whilst he continued to give instruction in a tepid, unventilated room. In other cases the rooms were so large and lofty that the teacher could not be heard at all unless he exerted himself very much, and thereby caused undue exhaustion. Another evil was the teaching different classes in the same room, which caused the teacher to roar to make himself heard over the confusion by which he was surrounded, and which was altogether destructive of that quietness, order, and discipline which ought properly to exist in the school-room. Besides, the teacher of the present day was compelled to exert himself more than formerly, because he was required to convey instruction to his pupils without the aid of corporal punishment, by which (without entering into the vexed question) he might be allowed to say the labours of the teacher were greatly increased. Again, 30 or 40 years ago the teacher was expected to know very little in comparison with the varied acquirements now required of him, and he hoped the Society and the Committee just appointed, would not lose sight, in their investigation, of so important a subject as the health of the teacher.

Mr. Hopwood might be allowed to observe, that it appeared to him, that the great cause of many of the evils alluded to, was the want of a sense of moral responsibility on the part of the workman for the preservation of his health. He believed that it was by showing those parties that by not taking proper precautions against the diseases to which they were liable, and on which not only their own interests but those of their wives and families depended, they were neglecting a duty to their families and to society, that these remedies would be best attended to. Men were too apt to be reckless of health when they thought only of themselves, but it would be otherwise if they could be brought to a sense of their moral obligations. Thus, a man having the control of a railway train, from a want of that sense of obligation in looking about him, caused a collision, which might be fatal not only to himself, but to many others; and a stone-cutter, who prepared stones for the whetting of scythes, &c., became entombed by the stone giving way, through the want of common wooden stubbs to prevent it doing so. He thought the subject altogether highly important, and that they

were deeply indebted to the Society for the opportunity of calling attention to it.

Mr. VARLEY said that, in order to lessen the evils which had been alluded to, he would recommend that where great numbers have definite employment, in difficult and dangerous places, particularly colliers and miners, it would be well to establish for each class the means of instruction in everything relating to their employment. The chemical properties of the materials, the geological structure of the place, the whole danger of the employment, and the mechanism of all their tools and appliances, also the great benefit to be derived from strict attention to wholesome cleanliness, should be made thoroughly known. There was, comparatively, little harm from the day's dust and black which obscured them, provided they began or ended the day clean from the bath, and had clean linen. Men respected each other in proportion to their cleanly habits; the feeling of moral responsibility was thereby increased; and the mind thus filled would make them better workmen and much more cheerful companions and helpmates, all which contributed greatly to promote health and strength. The dreadful loss of life by colliery explosions was a disgrace to the mechanical and chemical knowledge of the present time. In 1816 the Society gave their Gold Medal and one hundred guineas to Mr. Ryan,* for his means of removing the fire and choke-damp from mines, and a few years back the Government showed their real solicitude to remove the danger, by selecting the two apparently fittest men to examine a mine that had exploded with dreadful loss of life. He alluded to Mr. (now Sir Charles) Lyell, the eminent geologist, and Mr. Faraday, our greatest chemical philosopher. The latter gentleman, in a lecture at the Royal Institution, showed that it was practicable to draw off the dangerous gas; but those means were quite the same as what the Society had rewarded Mr. Ryan for long before; and yet nothing seemed to be done to put those means into practice. The evil could be lessened in proportion to the number of shafts sunk into any mine; but it was urged that the great expense of shafts rendered such a plan impracticable, as if valuable lives were to be sacrificed for the want of the necessary expenditure. It was well known that in all caverns where there was water running the air was pure. Now, coal mines were so dry as to cover the men with dust, but if water was introduced into such mines it would largely absorb the heat, and deprive an explosion of much of its mischief; and if there was always water enough to absorb the carbonic acid (or choke-damp), and air enough admitted to fire every inlet of gas, men would frequently have abundant light and no explosions; but the foul air must be drawn off, and lights should be kept burning in all dangerous places to kindle the gas as soon as it appeared, before it spread or mixed, and the heat thus produced would greatly assist in the ventilation. The present production of inflammable gas pushed back the fresh air that would otherwise enter the mine; if this were constantly burnt, it would be so lessened in bulk as to draw the fresh air in.

Dr. CAPLIN was afraid, as a foreigner, he might not make himself distinctly understood, but he could not refrain from expressing his gratification at seeing scientific men taking into their consideration the evils which afflicted the working classes, and endeavouring to alleviate them. Those evils, however, could not be remedied until the working classes were themselves made fully aware of their existence, and determined to put their shoulders to the wheel to remove them. He knew from his experience, as one of the Sanatory Commissioners of Manchester, how much the working classes neglected their own comfort. Dr. Chambers had spoken of a table for tailors; such a table had been tried in France, and failed, because, if a man had to alter his accustomed position, or change a tool, from want of practice he found he could not earn so much money as upon the old principle, and he reverted to it without giving himself time to derive the advantages which practice with the new implement might give him. He (Dr. Caplin) had invented an implement for preventing the pressure of the shoemaker's last, and the dangers incidental from the present use of the knife, but he could not get it adopted, the men being wedded to their old plan of working. They must educate the working-classes to see the advantages of improved methods of working, before they could get them adopted. Mr. Simon had made some very judicious remarks about blindness to compositors being prevented by the use of sixpenny glasses, and it was not likely that men educated to that fact would lose their eyesight for so small a saving. As regarded the advantages of education on any subject, he might mention that in Manchester Dr. Turner delivered a lecture on the necessity and importance of whitewashing the cellars in which many of the working classes lived, and the result was, that numbers of them clubbed their pence and twopences to purchase brushes, which were passed from hand to hand, to whitewash their homes, though they could not have afforded to expend 4s. or 5s. for the purpose. Why could the men not do the same for the purchase of gas glasses if the masters would not find them. We knew that in Manchester you could not take a glass or jug into a manufactory without its being broken, and such a feeling might prevent the masters incurring considerable expense for gas-glasses, but the men might easily obtain them for themselves by clubbing their sixpences together. He believed that the best way of improving the condition of the working classes was by instructing them, through the medium of lectures, that if they neglected the means of preserving their health and strength, they not only injured themselves, but brought ruin on their wives and families, and inflicted great injury on society at large.

Mr. SCOTT said, that two of the gentlemen who had addressed the meeting had, he thought, thrown too much responsibility upon the working mechanic and labourer relative to the preservation of his limbs from accidents, and his health from impairment. Self-guidance was undoubtedly a healthier feature, both in individuals and communities, than a reliance upon the direction and care of others; and the natural instinct of self-preservation would always, in ordinary circumstances, be found a sufficient guide to safety. But it ought to be borne in mind that in this country, and in other advanced European states, a large proportion of the industrial classes were not qualified to judge of the effects produced upon their physical condition by the occupations they followed; while another large class were placed in positions over which they had no control. Under these circumstances it could not be truly said that the mechanical workers in our industrial hive had their health and safety in their own keeping. It was well known that in America and in many of the Continental states, the law imposed greater responsibility upon the employers of labour, and allowed fewer of them who neglected the safety of those they employed to escape with impunity, than did the law in this country: and what was the result? Mr. Mackworth had very pointedly adduced the case of Belgium, where deaths and injuries from accidents in mines were less than one-half those that occurred in England amongst similarly employed classes; and this simply because life there was religiously hedged round by the state. Some years ago, he (Mr. Scott) was standing on the pier at Rotterdam, when a Dutch porter, who was landing tobacco from a ship lying alongside, happened to fall into the hold, and in an almost incredibly short space of time, an officer of the law tapped him on the shoulder, and served him with what we would call a subpœna, to attend a court next day. At the same time, the chief mate, who happened to be the officer in charge, was marched off by two officials armed with pipes and staves, and locked up! Next day, it was clearly made out that the *slings* in which the tobacco had been suspended were not proper and safe, and the mate was consequently subjected

* Vide Vol. 34 of the "Transactions."

to fine and imprisonment. Now, contrast this promptitude and humane care with what lately occurred in a house near the terminus of the Blackwall Railway, in this city, where a labourer, in digging the foundations of some new buildings there, cut a service gas-pipe belonging to an adjoining house, allowing one of the rooms to be filled with gas, which exploded when the wife of the owner entered with a lighted candle, injuring and disfiguring her for life. On account of the nature of our law and precedents, and the complication of contractors, sub-contractors, and subs under them, the injured parties were thwarted in their endeavours to bring home a claim for compensation to any responsible person. These might be said to be incidents pertaining to the mechanical view of the question, but what might be called its scientific phase was not less important; this consisted of unseen influences, felt, but not so easily detected, by the common observer. Unfortunately for his qualifications to speak from personal experience on this subject, his occupation, being agricultural, was peculiarly healthful. But still there was one deleterious influence, both upon man and beast, which he would venture to name, as he had long been in the habit of counteracting it; it was the ammoniacal gases usually allowed to float about stables, injuring the visual organs of the horses and the health of those who attended upon them. The first remedy he tried for this evil was gypsum, sprinkled over the floors night and morning; this proved a very good fixer of the ammonia, but having found that peat charcoal was a much better absorbent of the gases and salts of ammonia, he had latterly adopted it. The most illiterate farmer was aware of the bad effects of the pent-up air in stables upon his cattle, and upon the servants who attended them, but the general deficiency of scientific knowledge amongst that body prevented them from perceiving remedies for these or similar evils, and, in too many cases, of even appreciating them, when pointed out by others. Happily, scientific knowledge was spreading rapidly amongst agriculturists; and as Dr. Chambers, the exponent, he presumed, of the principles that were to regulate the action of the Pathological Committee, had stated that it would be their endeavour to *instruct* the minds of the employers and the employed, as to the nature of the influences that affected their bodily health in their several callings, as well as to collect facts for government to act upon, he (Mr. Scott) had little doubt but that quite as many physical evils which the industrial classes were now subject to, would be remedied by an increased knowledge of science, as by an increased stringency in the application of protecting laws. Having sometime ago been in Yorkshire, and attended a coroner's inquest, he had been forcibly struck by the extensive knowledge displayed by the coroner of the various causes of death, whether natural or accidental; and he would, therefore, venture to suggest that the Committee now formed should enlist the sympathy and co-operation of that body in aid of the end it had in view, and thus obtain invaluable assistance in carrying out the objects of this Society.

Mr. Winkworth said, that the remarks which Dr. Chambers's paper had elicited from so many gentlemen in the course of the evening, were so many independent testimonies to its great and varied merit. With respect to what had fallen from Dr. Caplin, he could unfortunately corroborate from his own experience, the charge that workmen were too generally unwilling to adopt improvements which had a tendency in certain occupations to lighten labour or remove obstructions to the free development of their physical powers. Early in life he had employed some hundreds of weavers in Spitalfields, and it was both a source of regret and surprise to him, that all suggestions for the amelioration of local personal suffering, were received with suspicion, and were with difficulty introduced. He hoped that the advantages of industrial education now so largely diffused, would be properly appreciated, and that appliances unknown or rejected by the present generation of operatives, would be cheerfully adopted by the rising one. Mr. Winkworth could also bear testimony to the truth of the remarks of Mr. Hugo Reid, as to the unwholesome condition of the greater part of schools for the many, both abroad and at home. It was generally known to the members that, at the instance of the Council of the Society, he had recently and successfully visited Holland and Belgium, for objects connected with the impending Educational Exhibition. In the course of his journey he had inspected many schools under the most advantageous circumstances, being especially accredited to them by their respective governments, and he regretted to say, that in scarcely any instance did he find the ventilation good. The most offensive was one for Jewish children at Rotterdam, and the most perfect was at the celebrated Jesuit establishment at Malines. At one school at the Hague, at which there were 700 children of both sexes in the room, the heat was very oppressive; and on his noticing the circumstance to the head master, he immediately ordered all the windows to be opened, by which a current of cold air was introduced, calculated to chill the bodies and derange the respiration of children of tender age accustomed to a hot and vitiated atmosphere. He trusted that one of the objects contemplated by the promoters of the Educational Exhibition, would be the introduction of an improved system of ventilation, and he knew of no one so well able to inaugurate the discussion of the subject there, as the gentleman to whom they were that evening indebted for the interesting and important paper out of which these remarks had sprung.

The Chairman stated that the time had now arrived at which it became his duty to tender the thanks of that meeting to Dr. Chambers, for his very valuable and interesting paper on Industrial Pathology. The paper was clear, practical, and suggestive. There had never been brought before the Society a subject more important, or more peculiarly suitable to the Society of Arts. People came here fancying that this was an association for the advancement of the Fine Arts, and, when they saw the great pictures, by Barry, which adorned these walls, that fancy was confirmed. We were a "Society for the Encouragement of Arts (Fine and Industrial), Manufactures, and Commerce;" and he hoped that the time would never arrive when we should regard "Arts, Manufactures, and Commerce" as abstractions to be encouraged and crowned with success, irrespective of the welfare of the human beings engaged in promoting them. Those beings, whether masters or men, were the Society's special clients, the very objects for which we were concerned. With reference to the Industrial Pathology of Schools, that part of the subject would, he hoped, be effectually dealt with in the approaching Educational Exhibition. It would be fully illustrated in the Exhibition itself, and in the lectures and practical discussions which were to accompany it. We should have the experience not only of this country, but of nearly all the civilised communities of the world. Many governments had appointed commissioners to visit this country, and to report upon the Exhibition and its results. Those foreigners would be able to teach us much, and we could teach them not a little in return. He was glad to have this opportunity of publicly expressing to the Marquis of Blandford, Dr. Chambers, Mr. John Simon, and Mr. Twining, the obligations which the Council were under to those gentlemen for giving their valuable services as the Committee on Industrial Pathology. The subject was well placed in their hands. They would do all that was possible with it; but all that they could do would be of little avail without extensive and continuous co-operation on the part of the members of the Society, and of the 356 Institutions in union with it. To the members of the Institutions, many thousands of whom were working-men, he would specially appeal for co-operation. They could supply the necessary data, the facts on which the deductions of learned men must be founded. It would be an excellent thing if some of the

Institutions would form their own Committees on Industrial Pathology, and communicate their results to the Society. Much had been said about the unwillingness of the working-classes to adopt improvements designed for their own benefit. This was true, and to be regretted. It was, however, an error common to all classes; and, if it were more frequently seen among the working-classes, we were more to be blamed for it than they. It was the result of ignorance; and, if they were ignorant, ours was the blame, for we had failed to supply them with adequate means of education. There were some noble words of Jeremy Taylor's which often pressed on his (the Chairman's) mind: "Where the poor perish for lack of knowledge, there shall those who are set over them perish also for lack of charity." These words had a peculiar significance in reference to the evils which Industrial Pathology proposed to abate. He rejoiced that the subject had at length been effectually taken up by the Society, in a manner that was worthy of its Centenary Session. After paying some compliments to Mr. Thomas Twining, jun., to whose persevering benevolence the present movement was mainly due, he presented the thanks of the meeting to Dr. Chambers, and assured him that the vote was not a mere matter of form, but carried with it the cordial sympathies of the meeting.

The Secretary announced that there would be an Extraordinary Meeting of the Society on Monday evening next, at the usual hour, for the purpose of resuming the Discussion on Mr. Slaney's paper "On Limited and Unlimited Liability in Partnerships."

Also, that on Wednesday, the 14th inst., the General Meeting to receive the Council's Report and the Auditors' statement of the Receipts and Expenditure for the past year, to which Meeting members only would be admitted, would be held.

THE NEWSPAPER STAMP.

The following letter from Lord Stanley, has been received by the Secretary to the Association for Promoting the Repeal of the Taxes on Knowledge:—

Albany, May 24th, 1854.

SIR,—No division having been taken on Mr. Milner Gibson's motion and the motion itself not going the length of a repeal of the Stamp-duty, I wish to give in my adhesion to the movement which you are promoting, so far as the abolition of that duty is concerned. The Paper-duty, as a financial measure, stands on a different footing. But the Stamp-duty is professedly imposed as a postal charge only, and not for purposes of revenue. It may, therefore, be dealt with quite apart from any considerations arising out of the war.

I only know three reasons which really influence men's minds against its removal. Some persons fear the political or social results of a large increase of cheap periodicals. This objection is removed by the existence, uncontrolled by law, of a cheap unstamped press, dealing with every subject except the news of the day, and even dealing with that in the way of comment. The danger which they fear already exists: the proposed change of law will diminish instead of aggravating it, by giving to the cheap press a character of greater respectability.

Others conceive that what is demanded amounts to this: that newspapers should be posted gratuitously. It would be well to have this delusion thoroughly removed. Newspapers cannot claim gratuitous transmission any more than letters: all that you ask is, that only those which require postal accommodation shall pay for it: and that the small provincial journal, which does not use the post-office, being distributed entirely by hand, shall not be taxed 50 or 100 per cent. upon its value in order that a copy of the *Times* may pass four or five times through the post, at the cost of a single transmission. You cannot put it forward, too clearly, that it is not the removal of the postal charge, but its equalisation, that you desire. The present law is as though a penny stamp were put on every sheet of paper, so that a note sent by hand, or a written memorandum kept for private use, should pay postage as well as a letter transmitted in the usual manner. Its anomaly and injustice could not have been tolerated until now, were it not that proprietors and editors of established journals circulating largely, have, or conceive themselves to have, a direct interest in maintaining a system which checks competition, and favors large capitalists.

I believe the fallacy here mentioned "that what reformers ask is a gratuitous transmission of newspapers by post," has done more mischief than, from its absurdity, would be supposed.

The third objection taken—a fear lest the Post Office revenues should fall off, seems wholly groundless. Any one who looks at the returns of that department will see an enormous increase of late years in the amount of work which it has to do, and consequently also in its receipts. I believe that a diminution in the number of newspapers conveyed by post, would more than compensate, in convenience, for the pecuniary loss which it might cause. But it must also be remembered that a large increase in the number of newspapers would render the Paper Duty (while that tax lasts) more remunerative; and, as was urged in the debate, that, if many more newspapers are published than at present, it is probable that at least an equal number will still pass through the post.

Justice has scarcely been done to the claim of the provincial press. Take such a case as this: and it is not an imaginary one. A local journal, published in a small borough, has 1000 subscribers; of these, 900 live within the borough; their copies are consequently transmitted to them by hand; only the remaining 100 copies are sent by post; the charge for which, at 1d. each, would be 8s. 4d. But the law imposes, under the name of a postal charge, this penny tax on the whole 1000 copies; amounting, in all, to 4*l.* 3s. 4d. on each impression; or, in other words, taxes the journal in question at the rate of 10d. for each copy which passes through the Post Office. Can it be imagined that this injustice should be defended, as I have seen it defended, on the ground that what is thus taken from the small journalist is put into the pockets of his metropolitan rival?

To those who apprehend that the character of journalism will suffer by an increase of cheap local papers, though holding their anticipations to be erroneous, I should reply simply by a refusal to discuss that question. We contend that as a matter, not of policy, but of simple justice, postal charges should fall only on those who benefit by the services of the Post Office. Whatever may have been the private opinions of public men, no minister of late years has dared to avow that the Stamp-Duty is imposed purposely as a check on low-priced periodical writing. To admit this, is to assert the principle of a censorship. For the existing duty, amounting to a tax of 100 per cent. on a penny journal, amounts, in fact, to a prohibition of all such journals. But, if this prohibiton is designed, it ought to be put in express words. What the legislature does, should be done openly. The question, therefore, is reduced to this—whether Parliament will continue to limit the right of publication to journals sold at and above a certain price? That this is the effect of the law, is clear: that it is also the object of the law, though that object is not acknowledged, seems impossible to doubt. Formerly, the Stamp-Duty was defended on financial grounds alone; now, we are told that the fiscal question is unimportant; the excuse varies from year to year, the policy is still obstinately clung to.

Two or three years must probably still pass before you

succeed: but the ultimate result is certain; meantime, I shall gladly join in attempting to remedy what is at once a great impolicy and a grievous injustice.

I remain,
Your obedient Servant,
STANLEY.

THE AMERICAN PATENT SYSTEM.

Dr. L. D. Gale, principal examiner of patents, of the United States Patent Office, read before the American Association for the Advancement of Science, at their Annual meeting held in Washington, Wednesday 26th April, 1854, a paper entitled "The American Patent System, and its Relations and Bearings on Science, and especially Chemical Science," of which the following is an abstract.—

The first part of this paper was occupied in describing the history of the Patent Office, from its organization in 1790, and before examinations for novelty and patentability were made. The author then went on to shew that under this practice there was no real confidence in a patent before it had been tested in the courts; that it often happened that the same device would be patented a second time in substantially the same machine, from the fact that the law made no provision for refusing or testing the alleged new invention.

He then noticed the several Acts of Congress that have been passed from time to time, improving the condition of the office and the system, until the Act of 1836, which made provision for examining applications on the novelty and patentability of the subject or devices claimed. This Act provided for an office called a Commissioner of Patents, and a subordinate officer called an Examiner of Patents, and still other officers and clerks, all of which have increased till the present time, when there are six Examiners, and the same number of assistants, and the same number of second assistants. The author then went on to show some of the peculiarities that distinguished the American Patent System from the European Systems. The first was that it aimed at giving no patent for any invention that had been described in any printed publication or known to have been in use in any country on the globe. In this way almost every patent granted was an absolute original contribution to the stock of knowledge in the whole world. Almost every patent granted was sustained by the courts, and confidence in patents after a time became unbounded.

In the second place, the writer stated that the high price of labour in the United States had operated in connection with the American Patent System to advance American inventions. From this cause farming implements of every description had improved more in the United States than in any other country. There are not more than some three or four grain and grass harvesters described in our books as known on the continent of Europe, while at least twenty a year have been patented in the United States for several years. After pointing out the peculiarities of the American Patent system, and the results growing out of the high prices of labour in mechanical inventions of various kinds, the subject of chemical science was brought forward, and the position taken, that chemical inventions are often both contributions to knowledge, developing new laws and ultimate facts, as well as improvements in the arts, while mechanical inventions improve the arts, but rarely develope new laws or ultimate facts. The author then went on to illustrate how it was that chemical science was advanced by the American Patent system as now practised, which is, that the process, or composition of matter (whichever it be) must be clearly described, and the difference between this and other related inventions set forth, and the gist of the invention set forth in the claim, and that these often present new and ultimate facts, and occasionally develope new laws, and thus operate to extend the bounds of science.

It was stated that about one-eighth of all the patents granted in the United States are Chemical Patents, and that many of the Chemical Arts are far in advance of the books, and hence little aid can be expected from them in such cases.

The writer closed the subject by pointing out the present condition of several of the Chemical Arts, showing that processes used are not to be found in the books on science, but only in the archives of the patent office. Thus for example, *Alcohol* is now prepared without heat, by merely putting whiskey into a column 100 feet high. In a few hours pure alcohol is drawn off at top, and nearly pure water at the bottom. *Merchantable paper* is now made in the United States of hickory, pine and poplar wood, and other forest trees of America:—and also of the cane from which fishing poles are made.

Colonial Correspondence.

THE OIL OF THE CAHOUN OR PALM TREE OF BRITISH HONDURAS.

Belize, British Honduras, April 15th, 1854.

SIR,—That large tract of country on the continent of North America, called British Honduras, is comparatively little known. Most people have heard of Honduras mahogany and logwood, but whether the place from which those woods are imported be in the east or in the west,—whether it be a continent, an island, or an archipelago, few people know, or care to inquire. It is, however, a very important and valuable colony, and deserves to receive greater attention than that which has hitherto been paid to it. The discussions on the Bulwer and Clayton treaty have brought it somewhat more into notice of late, on both sides of the water. The Americans are not so ignorant of this country as those to whose sovereign it belongs, and they have estimated it at its real value. For many years they have cast a greedy eye upon it, and have longed for an excuse and an opportunity of bringing to bear upon it the Monroe doctrine of European exclusion and transatlantic appropriation, a mild phrase, but having an extensive meaning. With these views, General Cass, in a long speech lately delivered by him to the Senate of the United States, labours heavily to prove that it is a part of Central America, in order that it may be brought within the provisions of the Bulwer and Clayton treaty. It is, however, not a portion of Central America, and was never so considered. The term "Central America" is a political and not a geographical appellation, and has always been understood to designate the five Confederated States of Guatimala, Honduras, San Salvador, Costa Rica, and Nicaragua. British Honduras, which embraces all that tract of country which lies between the rivers Hondo and Sarstoon, a distance of about 180 miles, is in North America. On the north it borders upon Yucatan, and on the south on Guatimala; Ysabal, the port of that state being only a few miles distant. My object, however, in now addressing you, is not to enter into a lengthened discussion of the claims of certain American senators in reference to this country, which would be very unprofitable, —for whatever opinions Mr. Cass or others may have upon this subject, we have got Honduras, and we intend to keep it,—but to draw your attention, and through you that of the British public, to a valuable article of commerce growing spontaneously in this country in profuse abundance, which has hitherto been entirely neglected. I allude to the nut of the Cahoun tree. This tree is, I believe, altogether peculiar to Honduras. It is not found in Jamaica, nor in any of the West India Islands. I made very particular inquiries respecting it when I was last in Jamaica, and I ascertained that it not only did not grow in that island, but that it had never been heard of. It is of the palm tribe, being, in appearance, very similar to the cocoa-nut tree. The branches are precisely the same in structure, but more widely spreading. It does not grow

nearly so high as that tree, and the trunk is considerably thicker. The order and regularity in which they grow are surprising. I have seen rows of them which presented the appearance of having been planted with the greatest care. I have witnessed long avenues which closely resembled the nave and aisles of a cathedral, the arched branches meeting overhead and producing an exact imitation of the vaulted roofs, and if the sun were declining, the horizontal rays shining at intervals through one side of the avenue, created the splendid effulgence of the most richly-painted windows.

This tree bears a nut about the size of a large hen's egg, which grows in huge clusters, each cluster resembling a bunch of grapes. The kernel tastes a little like that of the cocoa-nut, but it is far more oleaginous, and the oil which is extracted from it is infinitely superior. No other oil is burnt in this country but the cahoun and the cocoa-nut oil, but a pint of the former will last double the time that the same quantity of the latter will. This oil (the cahoun,) congeals at a temperature of 75 degrees. There is no question whatever, that, if it were known to the British public, it would completely supersede the use of the cocoa-nut oil, which is so extensively employed now in the formation of candles, and for manufacturing and engineering purposes.

The country of Honduras consists principally of two kinds of land; the one is called a "Pene Ridge," and the other a "Cahoun Ridge." The former is a sterile, sandy soil for the most part, but contains here and there patches of greater fertility. These "green spots" in the midst of this sandy wilderness are the resort of immense herds of deer and antelopes, the flesh of which bears not the least resemblance to the succulent, well-fed, venison of England, but is dry, white, stringy, and an utter stranger to fat. The only way to make it eatable is to disguise its real nature and dress it as veal, for which meat, after a long absence from it, it is a tolerable substitute. The pine ridge is covered with innumerable red pines, which are very much more resinous than the red pine of America. From these trees any quantity of pitch, of an excellent quality, might be extracted. This would also be a very valuable article of commerce.

The Cahoun ridge differs materially from the Pene Ridge. The soil of the latter, as I have said, is sandy and unproductive, whereas that of the former is rich and loamy, and possesses every agricultural capability. There is no tree, plant, fruit, nor root, which is produced in the tropics, which cannot be grown in great abundance upon these ridges. The Cahoun trees here abound. For miles and miles you have nothing but forests of them; and yet with all these forests of trees, bearing nuts from which a most valuable oil can be extracted, for which oil a ready market would be obtained in every town in Europe and the United States, no one has yet been found,—whether from a want of energy and enterprise, or from pre-occcupation in other pursuits I am not able to say—to turn them to a profitable account. Not one single bottle of oil has ever been exported to Europe, or elsewhere, as an article of commerce. Over these vast fields of wealth a few old negro women occasionally wander, picking up the nuts which have fallen accidentally to the ground, from which, in their rude and clumsy way, they manufacture as much oil, and no more, as will satisfy their personal wants, and purchase for them a few *luxuries* in the shape of pickled pork and gin, pipes, and tobacco.

I have forwarded to you by the "Armato," a sailing vessel, a box of Cahoun oil, and one of nuts, from which samples you will be able to test the correctness of my observations. As soon as the ship arrives in London they will be sent to you.

I should be glad, if, through your means, some enterprising individuals would undertake to develop the riches of this fine country, and establish this new branch of trade. Mahogany and logwood now engross, and always have done so, the entire attention of the merchants settled in Belize; but a much more profitable, more certain, and more durable trade awaits those who have courage, and capital, and enterprise, to open this new vein of wealth. It is no mine of gold that I describe; I hold out no hopes of mineral rewards, but I say, and I say emphatically, that an article more valuable, more healthy, and more permanently lucrative than the shining ore of Australia, and unattended with the moral depravity which accompanies gold in all its stages, from the moment that it is taken from the earth, through all the various changes which it undergoes during its eventful career,—offers itself to those, who, confiding in their efforts and their skill, will accept it.

British Honduras contains numerous navigable rivers and creeks, and on the banks of all these rivers the Cahoun tree is found in wild attendance. The river Hondo, the New River, the Northern River, the Belize, the Sibun, Manate River, Mullin's River, Sette River, Monkey River, Deep River, Golden Stream, Rio Grande, Moho River, and the River Sarstoon, are all navigable, and by them Cahoun oil could always be conveyed from the place where it is manufactured to the sea.

I enclose you a report relating to this subject, which has been kindly furnished me by Mr. Faber, the crown surveyor.

I have the honour to be, sir,
Your most obedient servant,
R. TEMPLE,
Chief Justice of British Honduras.

P. Le Neve Foster, Esq., &c., &c.

Belize, January 10, 1854.

DEAR SIR,—According to your request, I beg leave to forward some observations concerning the growth, products, etc., of the Cahoun or palm tree.

By the latest computations the settlement of Honduras contains 37,500 square miles, of which, I do not hesitate to assert, two-fifths are composed of what is commonly called here Cahoun ridges (Corossales in Spanish).

These Corossales or Cahoun villages, are mostly along the banks of the rivers, and possess the richest virgin soil; some of them are only one-quarter of a mile deep, while others extend to from twelve to twenty miles in depth. The Cahoun trees grow at an average distance of five yards from one another, thereby forming arches of evergreens, which soften the ardent rays of the tropical sun, and give a majestic air to those forests whose silence is only broken by the titter of bright-plumaged birds, or the solitary cries of some wild animal roaming in these wildernesses.

These Cahoun trees yield one crop every year; this crop consists of generally three, and sometimes four, bunches of nuts, as close together as grapes; the nuts are of the size of a small Turkey's egg, and on an average there are eight hundred nuts in one bunch.

The people here extract oil from them in the following manner: When the nuts are what they term full, they break, between two stones, the shell, which is very hard, then pound the kernel in a wooden mortar: the sediment is then put in a boiler with water, and boiled down until all the oil or fat floats; they skim the oil off, fry it in an iron pot, so as to disengage all the aqueous particles, and then bottle it; by this simple process, the average yield is one quart bottle of oil out of one hundred nuts.

With improved machinery more oil can be extracted, and if any one with some capital, having a ready market for his produce, would undertake such a manufactory, there is no doubt that the staple article, say nuts, will not be found wanting; there would always be an abundant supply on hand, because the women and children who live along the banks of the rivers, having nothing else to do during the dry season, and being certain of a trifling remuneration, would vie with one another to bring to such an establishment the produce of their labour, which only consists in picking up and gathering the nuts.

I have the honour to be, dear Sir,
Your humble obedient servant,
J. H. FABER, Crown Surveyor.

To his Honour Robt. Temple,
Chief Justice, &c., &c., Belize.

Home Correspondence.

DECIMALIZATION OF COINS AND ACCOUNTS.

Sir,—I beg the favour of a small space to reply to a letter of Mr. James Yates, which appeared in your journal of the 19th instant, especially as the differences between us are questions of fact.

I stated in regard to our avoirdupoise weight, that it was "the weight of all the German nations, and had been so from time immemorial." This Mr. Yates takes solemn exception to. He says, "with respect to the matter of fact, I regret to say that Mr. Miller is in error." "The English pound of 7000 grains is probably unknown throughout all Germany." Had I left the sentence objected to, to stand by itself, it might have been open to criticism; but I laboured through two dull columns, to show that I meant by that avoirdupoise weight, a weight of 7200 grains, and I summed up the sketch of its history by stating that "had that weight been left to us, we might have had a pound *almost* identical with the *money* pounds of all the German nations." I thought that was explicit and qualified enough. Supposing the two pounds of the German nations, the money and the commercial pounds, to have had the same origin as our own, one being founded upon the penny value, the other upon the penny weight, as the divisions are the same, the commercial pound would be just an ounce heavier than the other; and this, in the main, indicates the difference between them.

In the year 1524, the Emperor Charles the 5th, to remedy the differences which time had made in the standards of the various states, ordained that the Cologne mark should be the standard weight for money all over the empire, and from that day to this it has generally continued to be such. The pound is divided into 2 marks, 16 ounces, 32 loths, 128 quints, or 256 pfennings. The commercial pound varies considerably between various states, as much as our own between various shops in this metropolis; but I had not the commercial weight in view. It was the money weight, 2 cologne marks 7216 grains that I meant, and expressed. My thought was, that for the sake of uniformity, the other German states might be induced to do as Prussia has done, that is to say, abolish all but their money weight. Supposing I had not taken the money weights, the commercial weights, diminished as they have been by time, would have been sufficiently near to justify my assertion.

The following is the proportion the commercial weights bear to our old avoirdupoise weight, taking that as 100:

Amsterdam	105
Groningen	104
Deventer	101
Zwoll	104
Antwerp	100
Berlin	100
Cologne	100
Hanover	104
Emden	106
Stade	101
Brunswick	100
Cassel	100 / 104
Erfurt	101
Frankfort	100
Holstein	103
Keil	102
Rostock	109
Copenhagen	106
Bergen	106
Leipzig	100 / 10
Osnaburg	105
Mecklenberg	104
Wismar	104

Munster	102
Rotterdam	100 / 105
Stralsund	103
Lubec	104
Hamburg	104
Bremen	106
Munich	120
Nuremberg	109
Bamberg	104
Heidelberg	108
Strasbourg	100
Basle	104
Constance	101
Geneva	117 / 91
Lindau	123 / 99
Manheim	105
Durtzburg	102
Prague	110
Dresden	100
Venice	101
Vienna	120
Bautzen	107

Such a comparison is quite sufficient to show the relationship to our pound, and I trust that it will abate the poignancy of Mr. Yates's regret.

Mr. Yates also disputes my figures. In writing 900*l.* 9*s.* 9¼*d.* in pounds and decimals, I write it *l*900.489, which is correct; being as near as it is possible to write it in three places of decimals. Mr. Yates says that its true value is *l*900.4884816; but Mr. Yates is wrong, the true value is 900.4885416 (and a circulate of sixes.) Again Mr. Yates is wrong; he professes to exhibit the same amount in the franc mode, which he recommends, and he makes out the 900*l.* 9*s.* 9¼*d* to be f22,692.32. Now, gold for gold, at par, the equivalent in francs would really be f22711.72.; but he seems to have taken some impossible rate of exchange. This is unimportant, but they should not throw stones who have windows of glass.

Mr. Yates states that "in this country the metrical or French system, founded upon the gramme, is already employed for scientific purposes, and will certainly continue to be used in operations which require delicacy and correctness." In working from French formulæ, it may be sometimes more convenient to use French weights than to convert the terms; but that is not what the sentence means, nor what Mr. Yates intended it should convey. It means that the gramme is more susceptible of minute division than any other weight, or means nothing. the words "delicacy" and "correctness" being thrown in to produce a picturesque effect upon the imagination. We divide our own grain into its 10,000th part, which is minute enough for most delicate operations.

Time will not allow me to pursue Mr. Yates through all the tortuosities of his letter; but I must notice its conclusion. After a generous compliment, for which I sincerely thank him, he wishes me to pursue the subject in a more "comprehensive and philosophical spirit," and especially that I "would bestow upon the whole *systeme métrique*, the attention to which he thinks it is most justly entitled."

I beg to be permitted to state that it was the completeness of the *systeme métrique*, as a mathematical system, which, years ago, first attracted my attention to this subject. Yet when I count the cost, the trouble, embarrassment, and wrong which accompanied its introduction into France, and what was relinquished which linked her to other nations, I cannot think that she has been much the gainer by it. Disregarding history and experience, she wedded hersels to three bad measures, the metre, the killogramme, and the franc, from which I apprehend there is now no divorce unless she suffer another dissolution; and I think our own position preferable to hers, notwithstanding the mathematical consistency of her system, and the irregularities which mar our own. For us there is hope, for her there is none. I would preserve to the mechanic his foot rule; to the trader his pound weight; to all their pounds, shillings, and pence; but all these, and every other measure, of value, weight, space, or dimensions, Mr. Yates proposes to annihilate at one fell swoop. Such a project is "comprehensive" enough in the magnitude of its destructiveness, but I cannot call it philosophical, I call it criminal; and I believe in my heart that Mr. Yates is too good a man to do it, even if he had the power.

I have, &c.,

W. MILLER.

London, May 29th, 1854.

CHARCOAL VENTILATORS FOR DWELLING-HOUSES AND SHIPS.

Sir,—The principle of the Charcoal Respirator which I brought under the notice of the Society of Arts during the month of February last, may, I apprehend, be very advantageously extended, under particular circumstances, to the ventilation of ships and buildings.

If a thin layer of coarsely-powdered charcoal is enclosed between two sheets of wire-gauze, and inserted into a suitable frame-work in those portions of ships and buildings where foul air is apt to accumulate, such, for instance

as in the vicinity of water-closets and similar nuisances, all the impurities in the air will be absorbed and retained by the charcoal, while a current of pure air will alone be admitted into the neighbouring apartments. The charcoal ventilators should be furnished with a slide at top and bottom, by means of which they may be easily filled or emptied at pleasure. Such an arrangement would frequently be found useful in the close wards of hospitals, and in the impure atmosphere of many of the back-courts and mews-lanes of great cities. A layer of charcoal might be often advantageously placed in the lower portions of buildings, immediately under the wooden-flooring, as it would keep the floors warm and dry, and likewise prevent annoyance from any sewerage water or other impurities that might find their way into such situations. These are a few only of the useful applications to which charcoal powder may be made available for sanatory purposes. Many others cannot, ere long, fail to suggest themselves.

I am, Sir,
Your obedient servant,
JOHN STENHOUSE.

St. Bartholomew's Hospital,
June 3rd, 1854.

MECHANICS' INSTITUTE CLASSES.

SIR,—It is pleasing to find that the subject of solid and systematic instruction in Mechanics' Institutions is beginning to attract more attention. It is high time now that the great appliances of these institutions should be used for something more than recreation and amusement. With a little energy and activity, aided as they are now by the advice, encouragement, and support of the Society of Arts, there is some hope that they may, ere long, be rendered really efficient *Colleges for the People.* I should be glad if you will spare me room for a few observations on the subject, in which I shall restrict myself to one or two points which seem to require some further discussion or elucidation.

1. There seems a disposition to plan the proposed course more specially for that section of the working classes who may be termed *skilled artisans*, to the comparative neglect of that other and very large class composed of clerks, warehousemen, shopmen, "linendrapers, butlers, waiters," as your correspondent (Vide No. 78, p. 481) terms them. Now, sir, while I know the necessity for special courses adapted to the wants of certain classes of artisans, and desire to see such courses everywhere encouraged as much as possible, I object to this distinction in the *ordinary* course at the Mechanics' Institute. The clerk, the shopman, (or shopboy,) the waiter, the spinner, the weaver, the founder, the engineer, the brewer, and dyer, are in the same category in this,—the education which they should have had as *men*, for their own sake and for that of society, has been nipped in the bud at twelve or fourteen years of age, and far the greater portion of what they require to compensate as much as possible for the deficiency, is the same for all. Hence, then, if we consider the wants of those alone who need some special knowledge for the successful pursuit of their labours, we neglect a very large class, and deprive ourselves of the means and strength that would be gained by their co-operation. All alike who leave school before fifteen years of age, need some systematic course of study to develope or improve their faculties; and they also require instruction in mathematics, natural philosophy, chemistry, natural history, and physical geography. The artisan requires also more minute information in some department of mathematics, mechanics, or chemistry; but why may not all go together for the long way during which their wants are actually the same? It is well known that hitherto the majority of the students at Mechanics' Institutes have been of the clerk and shopman class, even in such towns as Glasgow, where there are vast numbers of chemists and engineers, and where there are courses of twenty-five lectures on chemistry, and as many on natural philosophy, given every session. Would it not be wise, then, to adapt the course so as to make it useful to the class that has already evinced a desire to take advantage of the opportunity, when this can be done so as to suit the other class also?

2. I should urge that no department of political science be included in the proposed course—not even political economy. It is manifest from recent occurrences that the working classes have a system of political economy of their own, very crude and raw, I dare say, but they are very jealous of the political economy of the classes above them, and will look with extreme distrust upon any system of education held out to them which inculcates political principles that they repudiate. It may be very proper to endeavour to teach them a sounder view of social science, but this may be done without damaging, by association with it, a course of unquestioned utility, which, by itself, they would be willing to accept. I should, therefore, suggest, that all subjects of government and political economy be severed from any general course of study desired to be acceptable to the body of the people.

3. Some curriculum should be laid down, or recommended, at least. The people need some guidance, not only as to the subjects to be studied, but as to the order in which they are to be taken. A course of natural philosophy to those who have no knowledge of algebra or geometry, or one on geology to those who do not know the most elementary parts of chemistry or zoology, is, in great part, a waste of time. A course of lectures on the following subjects, extending over three years, and accompanied by private instruction to those who desire more special information, (for their business, or to obtain a diploma,) and recommended by some body possessing authority or weight, would supply the great desideratum in Mechanics' Institutes:—

1st Year.	*2nd Year.*	*3rd Year.*
Language,	Chemistry,	Natural Philosophy,
Arithmetic and Algebra,	Algebra and Geometry,	Human Physiology,
Botany.	Zoology.	Physical Geography and Geology.

4. It seems very desirable that the subject of *language* should form a part of the course, and be introduced early. Without claiming for it the high position, as a means of mental training, assigned to it by some, it cannot be denied that the analysis of language is a very valuable mental discipline indeed; it exercises the faculties of attention, abstraction, thought and memory, leads the mind to turn inwards upon itself and examine its own operations, and conduces greatly to precision of thought and expression. Properly studied, it is a powerful aid in the much neglected art of *composition*, and assists in the development of a literary taste. It may also be made extremely useful by facilitating the acquisition of foreign languages, and the understanding of those technical terms which we have borrowed so largely from the ancient tongues. A course of eight or ten lectures on language, with private lessons, appears to me the most desirable introduction to the course of adult instruction, for whatever class it may be designed.

Your obedient servant,
H. REID.

May 22, 1854.

WARMING AND VENTILATION.

SIR,—On reading, in your Journal of May 26th, Dr. Caplin's remarks on Dr. Arnott's stove, also his hint to the public upon the practicability of applying the heat of the sides and back of fires to produce hot air to warm the room where the fire is, or other rooms, I beg to remark, for his information and that of other readers who may have not seen heat so applied, that the late Marquis Chabannes, in his calorifère stoves, made in London, and fully explained in his work published in London in 1818, obtained the heat from both the sides and the back of the

fire for the above-named purpose, and they have been so made up to the present time at the same manufactory, in Drury-lane. The late Mr. John Pontifex fixed many furnaces with the sides and backs made of hollow cast-iron, in lieu of fire-brick lumps, and the air being allowed to enter the bottom on one side and escape at the top of the opposite side, the heated air was used for warming. I have applied many of these to warm drying-rooms, workshops, &c. I think this plan may be adopted with advantage in the supply of heated air to assist in the consumption of smoke in small furnaces; the air could enter on both sides and escape through perforations made in the bridge, and would, to some extent, keep the iron lumps from fusion.

In the year 1813 I manufactured register and Rumford Stoves with the back and sides hollow, for producing hot air, or heating water for circulation, making baths, or other domestic purposes; also kitchen grates, having one side and part of the back applied to heat water in a boiler for steaming and other purposes, while the heat of the other side and remaining part of the back was applied to an oven. This improvement, made by me, rendered flues (which were attended with much trouble) round ovens and boilers, for domestic use, unnecessary. Ovens without flues were introduced to the public before that time. The late Mr. S. Holmes, of Castle-court, Strand, received from the Society of Arts, about the year 1796, I think, the gold medal, for the invention of an oven to heat without a flue; and the only defect I ever found in it was that the lump of iron, called the conductor, projected from the side of the oven into the middle of the fire, which was rather an obstruction when stirring the fire, and in a few years the conductor burnt shorter, and so lost power every year, and ultimately became quite useless for baking, without any possibility of being repaired, as the lump was only efficient when cast with the oven. The improvement I made in 1813, by placing the conductor in a line with the back of the L boiler, which I then constructed, rendered it impossible that the conductor could burn shorter. I have lately seen some of the ovens, that have been in use thirty-five years, as perfect as when first erected.

With regard to the remarks in the discussion upon Dr. Arnott's stove, I think the different speakers lost sight of a very material requisite for making the stove suitable for the million, namely, a proper supply of air.

In a work I published in 1852, upon chimneys, the consumption of smoke, &c., I described a house-stove patented by Mr. Cutler in 1813, for the consumption of smoke, and I there stated that as the air necessary for combustion could not be supplied in the usual way through the bottom—it being a plain plate, with coal upon it, the air was made to pass immediately over the top of the fire, to an aperture in the back of the stove, and thence up the chimney, and that, unless a very strong draught was kept up, the fire appeared dull. I frequently saw this in use, and used one in my own bed-room, and found it convenient for keeping a fire all night when required.

In a discussion at the Society's rooms upon the consumption of smoke, on the 30th of November last, I described the stove patented by Mr. Cutler, and the difficulty of producing a cheerful fire without an exceedingly strong draught over the top; I also gave a description of a furnace supplied with coal upon Mr. Cutler's principle, the coal being raised by a lever, with a rack and pinion; I also described the latter principle two months since, to another scientific body, in the presence of Dr. Arnott; perhaps the *hood* added by the doctor may cause the air to act more powerfully upon the front of the fire, but I much fear the hood will render it inconvenient for the million, who occasionally have to place a tea-kettle or saucepan upon the fire. I cannot give a decided opinion upon this point, not having seen the hood in use, having been at Hastings upon the evening of the discussion, but I heard a gentleman, who was present, remark that some one frequently raised the fire, evidently for the purpose of making up as much as possible for the non-supply of air at the bottom.

With regard to Dr. Arnott's other improvement, of supporting the fire with "a broad flat shovel or spade, of the shape of the bottom of the grate," while fresh coal may be supplied, if any should be required during the day, this principle was exhibited in the Society's rooms in 1852, in a stove, said to be patented, for supplying coals at the bottom, and is described in the appendix to my work above-mentioned. I also find a letter from Dr. Wyld, "Upon the Prevention of Smoke from our ordinary Fires," and published in the *Builder* of May 27th, 1854. After reciting the disadvantages of anthracite coal, coke, and gas, or gas and platinum, being "so unlike John Bull's Christmas fire," he goes on to state that "Cutler's stove, as improved and amended by Dr. Arnott, appears to me, although economical in its working and possessed of other good points, still amenable likewise to the above objection of being slow and dull, to say nothing of the pecuniary difficulty of converting every old grate in London into an *Arnott-Cutler* grate, if I may be allowed the expression."

I am, Sir, your obedient servant,

G. F. ECKSTEIN.

16, Lloyd-square, June 5th, 1854.

Proceedings of Institutions.

BURY ST. EDMUNDS.—The members of the Athenæum held their first general annual meeting on Friday, the 19th of May, the Hon. and Rev. Lord Arthur Hervey, President of the Institution, in the chair. In opening the business of the evening, by reviewing the successful course of the Athenæum during the past year, the noble and reverend chairman said, "He hoped the members would agree with him that the balance-sheet shewing the amount of subscriptions received, and the amount of support given to the society, was one of which they might well be proud, and which argued favourably for its future prosperity and usefulness. Though their lecture-session was closed, their library was still in full activity, and he looked upon it as the mainstay of the Institution. It was to the library, and to the diligent study of the books therein, that the members must look for the Institution performing that work which he trusted it would be enabled to perform in the town. A course of reading was absolutely necessary to enable the members to profit by the lectures delivered; and he would express his individual opinion, and he did not doubt having the concurrence of the officers of the Institution therein, that it would gratify them much, if a certain number of their younger members would address themselves to the Committee, for lectures on particular subjects upon which they had been reading, and in reference to which they wished for more information; this would indeed be hailed as a good omen." The secretary then read the report, in which the following gratifying facts were stated: The number of members for the year had been 450; the issues of books and periodicals 8791; the average daily attendance at the library and reading-room 120 visits; each of the 18 lectures and 4 conversazioni had been enjoyed by 400 or 500 persons. The total income for the year was 522*l.* 14s. 1d.; the balance in the hands of the treasurer 17*l.* 14s. 8d. The library comprised 2300 volumes; and last Whit Monday and Tuesday, 1680 persons visited the Museum attached to the Institution. After the reading of the report, the general business of the evening was transacted, and the proceedings closed by John Greene, Esq., one of the managing vice-presidents, proposing a vote of thanks to the noble chairman for his unwearied and efficient exertions in behalf of the Athenæum.

NEWPORT (MONMOUTHSHIRE).—The Report of the Committee of the Athenæum and Mechanics' Institute states

that the surplus on the year's accounts amounts to 13*l*. 9*s*. 11½d., the receipts having been 251*l*. 14*s*. 9½d., and the expenditure 238*l*. 4*s*. 10*d*. The average number of members of all kinds during the year was 393, against 379 the preceding year, showing an increase of 14. Some steps have been taken to procure an eligible site for the erection of commodious premises, as the present rooms are insufficient for the objects of the Institute. During the year 112 volumes have been added to the library, which now comprises 1,965 volumes. 8,509 volumes were circulated during the year, being an increase of 825 compared with the previous year. The reading-room continues to be well supplied with papers and periodicals, and it has proved so attractive that it has been thought desirable to make use of the committee-room as a reading-room, in order to prevent inconvenience. The lectures and entertainments have been numerous and attractive; but the committee is of opinion that, although entertainments such as concerts almost invariably prove successful and advantageous to the *funds* of the society, its true welfare will be best regarded by providing an *instructive* as well as an *amusing* class of lectures.

To Correspondents.

In the Journal of the 10th March, 1854, it is stated that "Samuel Bentham expended about 30,000 pounds of his own money in promoting progress." I would beg to correct this trifling error, since about that sum was the amount of loss sustained by the *two* brothers *jointly*, Jeremy and Samuel Bentham, in the construction of machinery, and in preparations for an industrial prison, on the panopticon principle.—M. S. B.

MEETINGS FOR THE ENSUING WEEK.

MON. Royal Botanic, 2.—Exhibition.
Inst. Brit. Architects, 8.
Society of Arts, 8.—Adjourned Discussion on Mr. R. A. Slaney's Paper, "On Limited and Unlimited Liability in Partnerships."
Geographical, 8½.—1. Lieut. R. Burton, "Late Visit to Mecca." 2. The late Prof. G. Walin, "Journey from Cairo to Jerusalem." 3. Dr. Livingston, "Further Explorations in Central Africa. 4. "On the Eastern Territory of the State of Ecuador, the Canton Quijo, the River Napo, and North-west Sources of the Maranon River."

'UES. Royal Inst., 3.—Dr. W. B. Hodgson, "On the Importance of the Study of Economic Science as a Branch of Education for all Classes."
Syro-Egyptian 7½.—1. Dr. Loewe, "On the Alterations made in the Translation of the ex-Patriarch Constantine's Letter by Mr. W. H. Blade. 2. Mr. S. Sharpe, "On Deciphering Hieroglyphics."
Medical Chirurgical, 8½.
Zoological, 9.

'ED. Literary Fund, 3.
Royal Botanic, 2½.—Promenade.
Royal Society of Literature, 4½.
Society of Arts, 8.—General Meeting to receive the Council's Report and Statement of the Funds of the Society.
Ethnological, 8½.
Pharmaceutical, 8½.
Archæological Assoc., 8½.

URS. Antiquaries, 8.
Royal, 8½.

I. Architectural Assoc., 8.—Nomination of Officers."

T. Royal Botanic, 3½.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 31st May and 1st June, 1854.

r. Numb.
. Lunatics (Middlesex)—Return.
. Shipping (Ireland)—Return.
. East India (Territorial Revenues, &c.)—Accounts.
. Public Works (India)—Return.
. Bills—Oxford University (a corrected Copy).
. Bills—Jurors and Juries (Ireland).
. Bills—Holyhead Harbour (as amended by the Select Committee).
. Bills—Public Revenue and Consolidated Fund Charges.
Common Lodging-houses Act—2d Report, by Captain W. Hay.

Delivered on 2nd June, 1854.

(4). Trade and Navigation—Accounts.
Greece and Turkey—Correspondence.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 2nd*, 1854.]

Dated 29th April, 1854.

969. C. Kingsford, 13, Buckingham street, Strand—Solidifying or indurating peat, &c.

Dated 1st May, 1854.

972. W. A. Waddington, York.—Sounding boards for pianofortes.
973. W. A. Archbald, 37, Stanhope street, Gloucester gate—Concrete cane-juice and sugar.

Dated 8th May, 1854.

1030. G. Thomas, 16, Osnaburg street, Regent's park—Framework of upright pianofortes.
1032. C. B. Normand, Havre—Sawing wood.

Dated 11th May, 1854.

1047. E. Miles, Stoke Hammond—Coupling joint for tubing.
1051. W. De la Rue, Bunhill row—Distillation.
1053. A. V. Newton, 66, Chancery lane—Carriage wheels. (A communication.)

Dated 12th May, 1854.

1055. J. Platt, Oldham—Spindles, rollers, bolts, &c.
1056. J. Ponton and J. Mackay, Chippenham—Railway wheels and tyres.
1057. W. Waite, 7, Gloucester street, Regent's park—Pipes for the conveyance of sewage, water, and gas.
1058. C. N. Nixon, Ramsgate—Rudders.
1059. D. Campbell and J. Barlow, Accrington—Looms.
1060. J. L. Holt, 4, Warwick square, and W. C. Forster, 84, Hatton garden—Making paper.
1061. H. Crowley, Manchester—Grinding bones. (A communication.)
1062. M. Poole, Avenue road, Regent's park—Splitting leather. (A communication.)
1063. C. W. F. Aubusson, Warren street, Fitzroy square—Ferrules.
1064. M. Poole, Avenue road, Regent's park—Engraving, &c., on glass. (A communication.)
1065. M. Poole, Avenue road, Regent's park—Fire-arms. (A communication.)
1066. A. E. L. Bellford, 16, Castle street, Holborn—Retarding decay of vegetable substances. (A communication.)
1067. A. E. L. Bellford, 16, Castle street, Holborn—Carriage axles. (A communication.)
1068. W. K. Westley, Leeds—Farm railway and carriages.
1069. F. S. Hemming, Woodside, Birkenhead—Iron houses.
1070. F. Smith, York street, Lambeth—Furnace for consuming smoke.
1071. A. V. Newton, 66, Chancery lane—Separating granular substances. (A communication.)

Dated 13th May, 1854.

1073. J. A. Drien, Patricroft—Machinery for cutting fustians, &c.
1075. R. C. Burleigh, 27, Northumberland street—Steam engines.
1077. H. H. Russell, York buildings, Adelphi—Coupling.

Dated 15th May, 1854.

1079. J. V. H. de St. Marie—Fixing capsules on bottles.
1080. L. F. Saugrin, Paris—Stereoscopic and photographic pictures.
1081. R. A. Brooman, 166, Fleet street—Railway wheels. (A communication.)
1082. R. Scott and T. Rowland, Basford—Machinery for knitted fabrics.
1083. P. Prince, Derby—Retarding railway trains.
1084. J. Chedgey, Grove, Southwark—Rollers and cylinders.
1085. W. E. Newton, 66, Chancery lane—Cutting wood. (A communication.)

Dated 16th May, 1854.

1087. T. W. Miller, Southsea—Railway sleepers.
1088. G. E. Dering, Lockleys—Motive power by electricity.
1089. A. H. A. Durant, Tong Castle, Salop—Sweeping chimneys.
1090. T. W. Miller, Southsea—Railway Sleepers.
1091. G. Manwaring, and W. A. Summers, Southampton—Water to water-closets, and for flushing drains.
1092. J. P. Baker, Wolverhampton—Railway bridges.

Dated 17th May, 1854.

1093. W. Smith and W. B. Hayes, Manchester—Looms.
1094. R. and R. W. Harris, Birmingham—Glass.
1095. G. Cheadle, Wolverhampton—Lubricating composition.
1096. H. Cornforth, Birmingham—Shaping and ornamenting metals.
1098. A. V. Newton, 66, Chancery lane—Tenon. (A communication.)
1099. C. Catlow, Clitheroe, and T. Comstive, Burnley—Shuttles.
1100. S. Diggle, Radcliffe—Looms.
1101. L. J. Wetherell, Percival street, Clerkenwell, and A. J. Heffstaedt, Albion place—Pump.

Dated 18th May, 1854.

1102. W. Coulson, Fetter lane—Morticing and tenoning.
1103. J. Worthington, Cardiff, and F. Allman, 9, Adam street, Adelphi—Boring, mining, and blasting.
1104. J. Horsfall, Birmingham—Wire for musical instruments.
1105. J. Beads, Pendleton—Spinning, &c.
1107. W Miller, Musselburgh, N.B.—Bleaching fibrous substances.
1108. O. Maggs, Bourton, Dorset—Shafts to agricultural implements and carriages.
1109. J. C. March, Barnstaple—Vices.
1110. J. H. Johnson, 47, Lincoln's inn fields—Printing telegraphs (A communication.)
1111. J. Maclean, jun., and T. Finlayson, Glasgow—Ornamental fabrics.
1113. J. C. Robertson, Glasgow—Roasting coffee.
1114. J. Hinchliffe, jun., Dam side, Halifax—Steam engine governor.

1115. C. Barlow, 89, Chancery lane—Metallic capsules for covering bottles. (A communication.)
1116. J. Cunningham and W. Ashley, Liverpool—Ventilating ships.
1117. E. A. D. Guichard, Paris—Ornamental fabrics for decorating walls.

Dated 19th May, 1854.

1118. J. A. Haberhauffe, Grossmuhlingen, duchy of Anhault—Fire-arms.
1119. B. J. Feuillatre, Paris—Cleansing carriage wheels.
1120. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Permanent way. (A communication.)
1121. T. M. Gladstone, Salford—Traverser for shifting railway carriages from one line to another.
1122. C. Rands, Shad Thames—Regulating feed of millstones.

Dated 22nd May, 1854.

1124. K. Rose, Commercial road, Stepney—Buttons.
1126. A. E. L. Bellford, 16, Castle street, Holborn—Pianofortes. (A communication.)
1128. W. and A. Crighton, Manchester—"Beaters" for cleaning fibrous substances.
1130. J. Crossley, Newton moor, near Hyde, and W. Crossley, Failsworth—Jacquard machines.
1132. R. A. Balbirnie, Great Malvern—Ships' compasses. (A communication.)
1134. W. England, Dudley—Pneumatic and hydraulic wheels and fans.
1136. H. S. Rogers, New Oxford street—Fire-arms. (A communication.)
1138. A. P. Rochette, Brighouse—Soap.
1140. R. and W. Oram, Salford—Hydraulic presses.
1142. T. Storey, Lancaster—Stench traps.

Dated 23rd May, 1854.

1144. F. Jenks, Handsworth, and T. Brown, Birmingham—Saddle trees.
1146. W. White, Cheapside—Hats.
1148. E. Radigon, and R. G. de Grimouville, Paris—Lamp shades, and smoke plates.
1150. R. Reyburn, Greenock—Refining sugar.
1152. J. Lawson, 4, Sidmouth street, Gray's inn road—Cut pile fabrics.
1154. J. Livesey, Bury—Forming slivers of cotton, &c.
1156. J. Smith, Henry place, Bridge street, and F. S. Thomas, South terrace, Walworth—Steering vessels.

Dated 24th May, 1854.

1160. T. Ball, Nottingham—Ornamented looped fabrics.

WEEKLY LIST OF PATENTS SEALED.

Sealed June 2nd, 1854.

2800. James Reilly, of 56, Thomas street, Manchester—Improvements in machinery or apparatus for tenoning, mortising, and sawing wood, metal, or other materials.
2804. Alexander Brown, of Glasgow—Improvements in metallic casks and other vessels.
2858. Jean Baptiste Edouard Ruttre, of Paris—Improvements in machines for producing shoddy from woven fabrics, and for sorting the fibres of fibrous materials.
2862. Andrew Shanks, of 6, Robert street, Adelphi—Improvements in instruments and apparatus for indicating or measuring weights and pressures.
2892. Christian Schiele, of North Moor Foundry, Oldham—Improvements in preventing undue oscillation in engines, machinery, carriages, and other apparatus.
2915. Benjamin Whitaker, of Brighton—Improvements in the manufacture or production of useful toys.
2937. Joseph Sharp Bailey, of Keighley—Improvements in machinery for operating upon wool, alpaca, mohair, and other fibrous materials, preparatory and prior to being spun.
2986. Jean Daniel Pfeiffer, of Paris—Improvements in machinery or apparatus for cutting paper and similar materials.
3002. John Parkinson, of Bury—Improvements in governors for regulating the pressure of steam, gas, and other fluids or liquids.
3027. Joseph Marlor, of Oldham—Improvements in ascending and descending mines and shafts, and in the apparatus connected therewith, by which said improvements the ventilation of mines is increased.
3028. Walter Mabon, of Ardwick iron works, Manchester—Improvements in machines used for rivetting together metallic plates.
3044. François Aristide Clerville, of Paris—Improvement in the construction of fire-arms.
22. Edward Schischkar, of Halifax, and Frederick Crace Calvert, of Manchester—Improvements in dyeing and printing textile fabrics and yarns.
114. William Blackett Haigh, of Oldham—Improvements in machinery or apparatus for tenoning, mortising, slotting, cutting, or shaping wood or metal.
130. Thomas Webb, of the Platts Glass Works, Stourbridge—Improved apparatus applicable to the annealing of glass and the firing of pottery ware.
139. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in cutting out cloth and other fabrics and materials suitable for garments and furniture.
290. Andrew Duncan, of Glen house, Denny, N.B.—Improvements in bleaching.
624. Antoine Edouard Paschal Le Gros, of Paris—Improvements in preserving timber, and generally all kinds of wood.
718. Frédéric Chambon and Alfred Meyniac, of Chaylard (Ardeche), France—Improvements in bleaching or scouring silk.
739. Archibald Douglas Brown, of Glasgow—Improvements in beds, couches, and other articles of furniture.
746. John Inshaw and James Parker, both of Birmingham—Improvement or improvements in suppressing the smoke and increasing the draught of the furnaces of locomotive and other steam-engine boilers.
766. James Higgin, of Manchester—Improvements in the mode or method of separating metals from each other when in conjunction, and in obtaining useful products therefrom.
785. Stephen Randoll Smith, of 2, Hanover terrace, Cumberland road, Bristol—Improvements in vessels and apparatus used for raising sunken vessels and other bodies in the water, and for lowering materials for structural purposes in water.
823. Thomas Whitehead, of Leeds—Improvements in machinery for preparing, combing, drawing, and spinning wool, flax, cotton, silk, and other fibrous substances.

Sealed June 5th, 1854.

2824. John Patterson, of Beverley—Improvements in reaping machines.

Sealed June 6th, 1854.

2829. John Coope Haddan, of Chelsea—Improvements in the manufacture of cartridges, and of wads or wadding for fire-arms.
2831. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—The manufacture of an artificial tartaric acid, and the application of the same to useful purposes.
2845. William Bridges Adams, of 1, Adam street, Adelphi—Improvements in railway wheels, their axles and boxes.
2846. William Thomas Henley, of St. John street road—Improvements in electric telegraphs.
2853. James Beall, of Effingham place, Cheshunt—Improvements in apparatus for applying sand to the rails of railways.
2869. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in portable cases for containing provisions. (A communication.)
3037. Joseph Holbrey, of Bradford—Improved machinery for combing wool and other fibrous materials.
161. Matthew Andrew Muir, of Glasgow—Improvements in weaving.
243. Richard Archibald Brooman, of 166, Fleet street—Improvements in the manufacture of steel.
499. John Baptiste Gottung, of 7, Hawley place, Kentish town—Embroidering on leather for harness and other purposes.
691. Herbert Room and William Morton, both of Birmingham—Improved method of ornamenting metallic bedsteads and such other articles of furniture as are or may be made of metal.
694. Samuel Humphreys, of Green street, Leicester square—Improved apparatus for the heating or distilling of fatty, oily, and resinous matters.
784. Jonathan Harlow, of the Bordesley works, Birmingham—Improvements in the manufacture of metal bedsteads.
802. John Henry Johnson, of 47, Lincoln's inn fields—Revolving, blowing, and ventilating water extractor for drying cloth. (A communication.)
818. John Henry Johnson, of 47, Lincoln's inn fields—An alkaline steam-washing apparatus. (A communication.)
829. William Worby, of Ipswich—Improvements in machinery or apparatus for separating grain from straws, broken-off ears, husks, and other refuse after being thrashed.
830. William Williams, of Park cottage, Ebbw vale, and Thomas Evan Williams, of Abersychan iron works, near Pontypool—Improvements in reverberatory furnaces.
836. William Wood, of Monkhill house, near Pontefract—Improvements in treating animal matters and refuse.
837. William Wood, of Monkhill house, near Pontefract—Improvements in apparatus employed in the manufacture of cut pile fabrics.
851. Uriah Scott, of Camden town—Improvements in the adaptation of elastic materials to boots and shoes, and shoes for horses and other animals.
863. Samuel Brewster Parker, of Deptford—Improved apparatus for consuming smoke.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
June 1.	3597	Cotton-Reel Brooch	Hill and Sandland	Birmingham and London.
"	3598	Noiseless Carriage-Spring	Benjamin Newnham	19, Broad street, Bath.

Journal of the Society of Arts.

FRIDAY, JUNE 16, 1854.

EXTRAORDINARY MEETING.

Monday, June, 12, 1854.

An Extraordinary Meeting was held on Monday, the 12th inst, William Tooke, Esq, F.R.S., in the chair, for the purpose of resuming the discussion on Mr. R. A. Slaney's paper, "On Limited and Unlimited Liability in Partnerships."

Some specimens illustrative of a new process of transferring the natural grain of different woods to paper, cotton, linen, and other materials, were exhibited by Signor Abate. An account of this process will appear in the next number of the Journal.

ADJOURNED DISCUSSION

On Limited and Unlimited Liability in Partnerships.

Previous to the renewal of the discussion, the Chairman called upon the Secretary to read a letter which had been received from

Mr. E. Heath, of Liverpool, in which that gentleman stated that, "since the discussion of that interesting question (the Law of Partnership) by the Liverpool Chamber of Commerce, in which I took part, it has occurred to me that, after all, the question has not been presented in its true bearing. It has hitherto been considered as a principle affecting the law of partnership, the admission of which would tend to diminish the high character of the mercantile classes of this country, and hence great apprehensions have arisen; but a close examination of the question, in relation, at least, to the form it must assume in partnerships *en commandite* (which is the desideratum mainly contended for), will show that the real problem to be solved is this, viz.,—Upon what terms shall a man, taking no part in a business, be permitted to lend his money? Shall he, as now, do so at a fixed rate of interest, *however* high, from year to year, with power suddenly to withdraw it, and with the privilege of ranking as a creditor in case it be not withdrawn; or shall he lend, it (as proposed) for a consideration varying according to the profit made by the borrower on the use of the money, but subject to certain conditions for the safety of the creditors of the borrower, viz.:—1. That it be lent for a term of years, and the power of the lender to withdraw it be suspended during that period. 2. In case of failure of the borrower, that the lender shall not claim for dividend until all other creditors be satisfied. Now, looking at the question in this aspect, I think it ceases to be a matter of Partnership at all, and, by so ceasing, it becomes happily disembarrassed from a number of objections which have hitherto been permitted to perplex our judgments."

Mr. Elliott said, truth, they were told in an Eastern fable, lay at the bottom of a well very deep, and to get at it, they must undergo a considerable amount of arduous and disagreeable labour. Might he not apply that fable as an illustration of the difficulties of those who took his side—the unpopular side, of the question on this subject. He knew that the question of limited liability was one which was very popular with the unthinking portion of society, but he believed he should be enabled to show that the arguments of its supporters were founded upon sophistries, the most shallow and unsubstantial. They talked of doing justice to the people, and allowing them freedom of investment, and thereby endeavoured to lead them from the stern justice of the present system of trading, to the adoption of the dishonest system of trading under commandite partnerships. They told them that if commandite partnerships could be formed, that they would obtain great advantages for the labouring classes, that the middle classes of the Empire would become wealthier, that the prosperity of the rich would be increased, that they would have greater production in their manufactures, greater freedom in their commerce, and, moreover, that the law of commandite would dispense with the necessity of paying their debts. They were told that if the present partnership laws were abrogated, there would be no difficulty in getting capital for gas works, water works, docks, model-lodging-houses—a favourite topic with those who talked of the philanthropy of commandite—and every other kind of speculation which people, it was said, were afraid of speculating in under the present stern and just law of partnership. If he omitted to notice any of the arguments of the advocates of the law of commandite, he should be glad to be informed of it, as the subject was so large, and it had been so overwhelmed by fallacies, that it was almost impossible to bear in mind the heap of error he wished to endeavour to correct. He was afraid that if the law of commandite was admitted, it would be soon found like the apples of the Hesperides, beautiful to look at, but nauseous to the taste. He should have little hope of arresting their attention on this subject, did he not feel that where men shared the profits of speculation they ought also to be made liable for all the consequences; that was the unerring law of nature, it was the law of the country, and it was founded upon the principles of honour and justice. It was laid down by these laws that wealth was only to be obtained by hard industry and hard thrift. Scripture told them that he who maketh haste to be rich shall not be innocent. It was a great fallacy of Mr. Slaney's that, if they allowed the law of limited liability to prevail, the working-classes would be enabled by it to improve their condition—that the idea would be removed from their minds that they were treated by the laws with harshness and injustice—and that, if that law of partnership were allowed, they would be at once enabled to put their savings together to create a large capital, by which they could enter into manufactures, and combine in their own persons the wages of the workmen and the profits of the master. If he could hope that such a result would be obtained, or even very partially so, it would go a great way to induce him to forego his opinion; but there was nothing in the present system to prevent working-men clubbing their capital together, and entering into partnership. That which could be done by two or three men now, might be done by 200 or 300. The only difficulty was that they were, like all commercial men, liable for the consequences resulting from failure; and why should not all men be liable for the consequences resulting from the acts of their gerant or manager. He could not think why the liabilities of a man in humble life should be limited more than those of other traders. But the real truth was, that the law of partnership did not apply to working-men at all; for if they put 50*l.* each into a partnership, and it was all lost, they would lose all they had, and the liability of partnership could not affect them, whatever might be the amount of debts incurred. If all a working-man had was gone, it could be no matter to him what was the extent of his liabilities; and, therefore, the partnership laws were altogether inapplicable to his case. Whatever might be said on the subject, there was no practical impediment under the present laws in the way of the prudent, industrious man advancing his position—and that, in putting this question in a philanthropic point of view, its advocates were endeavouring to enlist public opinion in support of a shameful fallacy. But they were told that working-men had no facilities given them for investing their savings—that they could not improve their position; that was not true; for years past it had been the study, and the successful study, of many eminent men to enable them to do so. What would become of the savings banks if it were not for the thrifty habits they encouraged amongst working-men, and

the opportunities they afforded them of saving up capital safely and honourably; statistics showed that the working classes made immense use of these banks, and that their use was increasing, for he found that the number of depositors on the 30th November, 1830, were 412,000, and that the deposits amounted to 13,500,000*l.*; whilst on the 20th November, 1848, the number of depositors amounted to 1,000,000, and the deposits to 28,000,000*l.* These figures proved that there was nothing in the law to prevent working men from profitably investing their savings, and that there was happily a growing disposition to take advantage of the facilities afforded them. The state of the National Debt offered still more conclusive evidence of the use made by the humbler classes of the opportunities afforded them of safely investing their small savings. In the year 1848, the total number of fundholders was 284,000, and of that number 96,000 were in the receipt of dividends of 5*l.* and under. So it would be seen that about one-third of the creditors of the nation consisted of persons in very humble life, who, having saved a little money, were wise and prudent enough to invest it where every shilling of the wealth of the country, and every acre of land were pledged for its safety. Would they tell him, then, that there were not abundant opportunities for the investment of small savings. As fast as the working man created wealth, he might safely invest it, and it was far better to make a safe investment at a small interest, than a speculative investment at even the largest interest. During the late strike of the engineers at Greenwich and Deptford, it was found that not a few of them who had been earning their 40s. or 50s. a week, had means to fall back upon whilst out of employment; one had invested his £10 or £50 in a grocer's shop, another in a greengrocer's, a third in a haberdasher's shop, and so on. These shops had been conducted, whilst they were in employment, by the wives and families of the men, and afforded them the means of support during the strike. If they went into small country towns, they would find that the carpenter, the saddler, or the shoemaker, was but a poor tradesman, because he was suffering from want of capital, owing to his not having been sufficiently prudent in his younger days. Nearly all these men had worked in London, and received their 25s. or 30s. a week, but they had not saved anything, and when they started in country towns they had to look to the bill broker, or the banker, for the means of conducting their business; they were not the parties whom an alteration in the partnership laws would benefit. The fact was, millions might be profitably invested in retail trades, which traders did not possess, because they did not possess thrift and industry. They ought to teach men that if they earned 30s. a-week, they should set aside 10s. or 15s. out of that sum, and the reason why working men did not become rich was, because they did not do so. In Leicester, there was scarcely a weaver who possessed his own loom. The looms generally belonged to small capitalists, who let them out at so much a week. How was the Leicester weaver to become rich, if he was not industrious and thrifty enough to enable him to buy a loom. What advantage would the Leicester weaver gain by an alteration in the law of partnership? He might be told that the case he was adverting to did not apply; but in no case whatever, until they could give working men forethought and thrift, could they become rich. They were told that if the law of partnership were altered, there would be found amiable and philanthropic individuals, who would support the working men with capital, and enable them to raise warehouses vieing in extent with that mercantile palace which, on the other side of the way, was now rearing its head in rivalry with St. Paul's. Did they think that any prudent capitalist would join 100 or 500 men in a commercial speculation, who had arrived at adult age without showing that they had the moral courage and the thought to create some capital for themselves. It appeared to him absurd to suppose that any capitalist would do so even if the law of partnership were altered. It did not appear that such an alteration would give to the amiable philanthropists better opportunities of starting the working men in manufactories than they now possessed. Suppose they wished to back any body of men to the extent of 10,000*l.* or 100,000*l.*, they could lend them the money at 5 per cent. interest. He would not give much for the philanthropy of that man who would not lend his capital at 5 per cent. interest, but would come forward with the chance of partaking of aërial profits if he could be secured from loss. Those who rode in carriages could not expect to get large profits out of any business in which they did not take an active part. Let capitalists who wanted to benefit men in humble life lend them capital, and become special creditors at 5 per cent. interest. He could not give much credit to those who wanted a larger interest, for any very philanthropic views with regard to benefiting others. But if they did want to do so, there was nothing in the present law to prevent their lending their money at a higher amount, and taking a graduated interest according to the profits—thus, 5 per cent., 7½ per cent., 10 per cent. The present law would allow of that, and, therefore, he could see no reason for introducing into this country a foreign and dishonest scheme of partnership. Now, with regard to the middle classes, they were told that the large manufacturing establishments of London or Manchester had in their employ numbers of young men, who having been working therein ten or fifteen years with unblemished characters, the principals would be glad to start in business in different country towns, if the law of partnership would allow them to do so. Could they not do so by lending them 1,000*l.* or 5,000*l.*, at moderate interest, by selling them goods at a fair price, taking bills for the payment, and renewing the bills as they came due, so as never to cripple the young men for want of capital? The fact was, these parties wished to make more of their capital than any man could safely pay out of his fair profits, and under the guise of benevolence to these young men they wanted to put money into their own pockets by starting a number of country establishments, where they hoped to obtain large profits, without those risks which all experience told them such business must bear. They were told that if there was unlimited liability in partnership, it would afford excellent opportunities to men of 60 or 70 years of age to retire from the cares of business, and to start younger and more active men in their place. He thought that, when men arrived at the age of 60, 65, or 70, and had made good fortunes by business, they ought to be possessed of some other ideas than those of continuing to make large lazy profits on their money. If such men wished to start others in business, would it not be more creditable for them to lend £1,000 or £5,000 on special securities, than to make an advance by way of a partnership. But they would not do so, because they wished still to enjoy the profits of business, whilst they were willing that others should do the work. He maintained that with a limited liability partnership they would not have their capital so well protected as by lending it on special security under the present law. By the law of *commandite* they could not interfere at all in the business—they had no right to inspect the accounts; whilst as creditors, under the present law with special securities, they might do so, and, to a considerable extent, protect themselves from loss. It appeared to him that a man who was not content with the security afforded him by the present law, made too strong an appeal to their sympathies when he attempted to come before the world as a philanthropist. In secret contrition such a man must sometimes lament with Burns's Holy Willie:—

> "But yet, O Lord, confess I must
> At times I feel of gold the lust,
> An' sometimes, too, wi' worldly trust,
> Vile self gets in,
> But Thou rememberest we are dust,
> Defiled in sin."

To tell them that the laws of the country stood in the way of talent and industry advancing itself in the world, was to ignore entirely the history of the merchants of London, who had been the architects of their own fortunes; and Manchester, Birmingham, Leeds, and other manufacturing towns, abounded with working men who had raised themselves to independence by thrift and industry. Bailey, the ironmonger, of Gracechurch-street, who had lately died, leaving behind him £100,000, had begun life as an errand-boy, with 9s. a-week; and Mr. Gillott, of Birmingham, the celebrated steel-pen manufacturer, entered upon life as a working-man, and yet it was stated that he had very recently paid £90,000 for an estate. It was in vain for any one to say that the present law stood in the way of a working man making himself a position in the world. It did not do so, though before improving his position a man must be content to wait, and show to the world that he possessed such talent, industry, and thrift as should obtain for him confidence and support. They must not think to make a fortune at the outset of life—they must not expect to gather wheat in May, or grapes in June. So far from talent waiting for capital all commercial men knew that capital was waiting for talent—and the tendency of the possessors of capital was rather to take up schemes which had not sufficient solidity for their basis, than to give them the go by. Excepting under very extraordinary circumstances, all inventions of any sort of merit, and likely to become of use, were too readily brought before the public—though it was a notorious fact that not one patent in 100 proved to be useful. He was in the habit of looking down the list of patents published in the Journal of the Society, and, if he saw any one connected with his own business, of writing to the inventor. Some of those parties communicated with him, and others did not—and he found that nearly all these inventions on which men had been expending their time and talent, were useless in practice. Men seemed to think that any alteration in shape of a given object was an improvement, but it was not so, and of the many hundred inventions in his trade he only knew of one produced in the last fifty years which had paid the inventor. He thought these facts ought to dispose of the practical part of the question, though he could not suppose that they would settle it in the minds of those who were determined upon endeavouring to get an alteration in the law under any circumstances. Mr. Slaney asked them why they did not alter their laws so as to make them like those of France, the United States, and other trading countries. To that he would answer, because the condition of the commerce of those countries gave them no satisfactory evidence that the law of *commandite* or limited partnership worked well. He said it without meaning any offence to the merchants or manufacturers of that country, but the fact was, the trading wealth and the commercial honour of France did not equal that of England—notwithstanding that country had the advantage of bankruptcy laws very superior to those of England. He trusted that no alteration of the laws would ever be sanctioned which should have the effect of lowering the commercial honour of England. All the facts, as far as they could be arrived at, showed that the plain ordinary laws of partnership, as they existed in this country, were far superior to those of *commandite*—the advocates of which could never bring any statistical facts forward in support of their fallacious arguments. Mr. Hawes had taken the trouble to circulate a number of inquiries on the subject, and though he had not received such answers as would enable him to say what was positively its effect in every country, sufficient had been obtained to justify him in advising that they should hold their hands for much additional information before they let go the stringent, just, and wholesome law of partnership which they now possessed. His answer to the question why the law of *commandite* should not be introduced into this country was this, because it gave greater facilities for fraud, and opportunities for escape from the consequences of that fraud than the present law. They had the law of *commandite* in the Levant, and there was no place where credit stood so low. Two joint-stock banks, one at Constantinople, and one at Smyrna, had failed in consequence of scandalous management. Greek merchants did not enjoy very high commercial credit. In Italy, where the law had long existed, commerce was entirely exhausted. Troplong said that the law of limited liability had originally come into operation there, because the nobles wished to avoid the censures of the church for usury, and to take the profits without bearing the name of traders. That was the secret why the law had been introduced into Italy, and why it was now urged here was this,—its advocates wanted the gold of commerce in their pockets without gaining it by sordid hands, and without wearing the dirty apron, a state of things which the law of nature forbade.

Mr. Winkworth begged to call the attention of Mr. Elliott to the fact, that their time for discussion was limited, that several other gentlemen were anxious to speak on the subject, and that he had already addressed the meeting for three-quarters of an hour.

The Chairman said the speaker kept strictly to the subject, and had the attention of the meeting, and might continue.

Mr. Elliott said he had not exceeded half an hour. He would, however, endeavour to bring his observations to a close, and advise that as Englishmen had gone on well so far, they should not merely act upon the conservative motto of letting well alone, but that they should let the best possible law on the subject alone. There was no nation in which limited liability prevailed but whose credit was much lower than that of Great Britain, and it was their duty to prevent any of these fantastic alterations of the law being carried into effect, as all the examples of the countries where the law of *commandite* was in force, showed that it tended to lower the commercial honour, the commercial influence, and the commercial wealth of the country. To adopt limited partnership here, on the example of other countries less commercially prosperous than ourselves, would be as wise as if a man in superior health were to follow the dietetics of his more sickly neighbours. If we did act thus foolishly, some future historian, writing on the decline and fall of our commerce, would quote the lines written on a certain man's tombstone—"Was well; wished to be better; took physic, and died."

Mr. Charles Hill believed that some little doubt had been expressed whether this subject was one which ought to be brought under the consideration of that Society, but when he looked at the benefits which had arisen from suggestions made at that Society, and considered how instrumental joint-stock capital had been in the carrying out of objects of utility, he could not for a moment think but that this was a very fit and proper subject for them to take up. He felt bound to respond to the taunt of the last speaker. That gentleman stated the witnesses examined before the Committees on this subject, had indulged only in opinions, without bringing forward any practical illustrations in support of them. He had been for twenty years daily and hourly connected with joint-stock companies, and, if he gave an opinion as to what could or could not be done, he did so upon his own experience, and those who heard him must judge whether or not his opinions were well founded, and whether he had had sufficient experience to justify him in giving an opinion. He would ask them to suppose the case of an individual bringing to the Society an invention which would take 5,000*l.* to work. The inventor required credit to that amount, in addition to the actual capital to bring out his invention; and suppose he could get the latter from a person as a partner with a limited liability. If the invention did not succeed, there were no profits for the partner, neither was the inventor liable to reimburse the capital. But it had been suggested that the capitalist

might lend the money to the inventor, and if he did so, what would be the result supposing the invention did not succeed? Why, he would be burthened with a debt of 5,000*l.* Could it be seriously urged before any body of commercial men that it was better to start in the world with a debt of 5,000*l.* rather than with a partner who put that amount into the concern. Now let them look at the position of a person borrowing the money and being unsuccessful; at the end of the first year he would have added the amount of interest to his debt, and his liabilities would go on increasing from year to year, until he became bankrupt by the withdrawal of the capital. The philanthropic old gentleman of 70, introduced by the last speaker, who was willing to advance money at interest if he had special security for it, would if partnerships were limited, instead of asking for good and special securities, say, "Here my boy is the money; I trust you will do well with it. I should be sorry not to leave the world better than I find it; take the 5000*l.*, and though I shall be glad if you do well for both of us, I shall not regret it if I lose it." In his opinion the whole question had been settled, so far as argument was concerned; and though the gentleman who had just spoken had had a whole week to prepare himself, he had not brought forward a single argument which had not been answered over and over again. The Committee of the House of Commons on the joint-stock laws, had, as long since as 1844, laid it down in their report that they required some alteration. A subsequent Committee had declared that the laws required immediate revision; and of the last Commission a majority had contented themselves by expressing an opinion that they should be careful in altering laws which had been some time in existence—whilst three of the members had yet to make their report upon the subject. Was it any argument against the alteration of a law to say it had been some time in existence? Why some of the most odious laws which had been worked out of the statute book had been "some time in existence." But though the Commission made that report, they said that greater facilities ought to be given for obtaining charters. What was that in point of fact but saying that there should be limited liability. Did not the recommendation for greater facilities in obtaining charters militate against the arguments of those who maintained that there should be no alteration in the law? The requisite alterations in the law of partnership, but for the opposition of large monopolists and interested parties, would long since have been enacted. Let him refer to one trade—that of brewing, which, from the peculiar state of the law, was a monopoly. Could not others, if they had an opportunity of going into the trade, produce beer at a lower price, leaving out of consideration quality, which they need not then say anything about, as any other large brewer. Could any one say that if they had limited liability they might not get up a brewing company in six weeks, and oppose and break down the monopoly which now existed. Then with regard to model lodging-houses. It was admitted on all hands that such buildings were required in consequence of the improvements which had taken place in London, but individuals did not come forward to construct them, in consequence of their being looked upon more as works of charity than as Commercial speculations. Lodging house abominations were very great, and the principal impediment to getting gentlemen to come forward to remove them, was to be found in unlimited liability. If, however, a person could put down his 100*l.* 50*l.*, or 20*l.*, and be relieved of all further liability, the people would take shares and would feel it their business to lodge in them for their own advantage, as they would have the satisfaction of knowing they were not indebted to charity for the accomodation. To go upwards, he happened to live in a district which was supplied with water by the Grand Junction Company, who charged, 7*l.* 12*s.* 6*d.* a year for his water. The act limited the charge the company should make to the public; yet in opposition to their own act of Parliament, they charged one-third more then they were entitled to. They had tried to obtain redress but without success, and though he looked upon the charge of more than they were entitled to, as almost amounting to a felony, he was obliged to submit because they threatened, if the amount were not paid, to cut off the water. What remedy could they have for such a state of things so efficient as limited liability. Why if limited liability existed as the law, in six weeks they would have a company to oppose the Grand Junction, and the consumers would be the shareholders. He might be answered, that if they went to Parliament for a bill, they would obtain limited liability for a water company; but if they did go to Parliament the old companies would see the danger which threatened them, and unite together to get the Bill ejected, and experience showed them that in doing so they always met with tolerable success. This was one of the things to be said in favour of limited over unlimited liability; where limited liability existed they must always get sufficient money for a public company to work it efficiently before commencing operations, or they would not be enabled to obtain credit; and all experience showed that where calls were made, upon each successive call there was less paid than upon the former one. Under the law which he cited the creditors would always be able to take care of themselves. They would look at the condition of the company and what it was doing, the same as any man in the commercial world would inquire what was the position of A, B, or C, before opening an account with him. But that was not the case now. The directors who had patronage to give away went to the tradesman, and showing him the list of shareholders entered into an arrangement that they were not to be held personally responsible if anything went wrong. The tradesman could see at a glance what good names there were on the list, and saying, "Oh, these will do for me," any shareholder might find himself pounced upon for debts of the existence of which he knew nothing. Was there ever an action for debts incurred by a company brought before a court of law against a director; was it not always brought against a man that knew nothing of the management? If the law of limited responsibility existed, a person before giving credit to a company would see what capital was paid up—he would inquire from the directors what shares they had issued—what provision they had made to meet their engagements—what was the amount of such engagements—and what was their reserve fund. Now let them look at the anomalous state of the law as it now existed. Parliament was constantly granting bills to companies, for different objects, with limited liability. At the Lands End the cost-book principle prevailed, by which limited liability was obtained for mining, and limited liability was had for building and land societies and for industrial institutions. They had a railway on each side of the Thames which enjoyed the advantages of limited liability; but the idea of granting limited liability to steam-boats which run upon that river, and were looked upon as the nurseries of our seamen and the bulwarks of our natural strength, was pooh-poohed. Was it not monstrous folly to give limited liability to the railway companies, and not to the steam-boat companies. Now, let them look at the number of private bills which were passed in the last seven years. There were for bridges, canals, harbours, and piers, 127; relating and giving powers to private companies, 147; draining and enclosing land, 34; lighting, watching, and improvements, 288; turnpike and other roads, 111; railways, 781; miscellaneous, 34; making a total of 1522, nearly all of which were granted with limited liability. Where could be found more monstrous folly than that the legislature should maintain the principle of unlimited liability, and yet give power to so many companies with limited liability. He had copied from the list in the registration office the number of companies registered last year, and he found there had been 339 provisionally registered, and only 124

completely registered. That illustrated the disparity between the number of companies projected and the number proceeded with, and which, in a great measure, was in consequence of the want of limited liability to give people confidence to proceed with them. Take, as a further illustration, the position of the trade in coals. If they engaged in mining in Cornwall they had limited liability, because they could at all times, at a bi-monthly meeting, withdraw from a company without incurring further liability; but if coals got up to famine price, they could not combine to establish a company to reduce it, because limited liability did not exist with respect to coals, the trade of which was entirely in the hands of large monopolists. It was an absurdity to argue that such a state of things should be allowed to continue to exist; but there were other anomalies in the law which required amendment. If they sought for an Act of Parliament for a public company, Parliament had required that 5 per cent. on the capital should be deposited as a proof of the good faith of the parties prosecuting the Bill; but Parliament had not deemed that amount sufficient, and they had therefore increased it to 10 per cent. But what was required by the Act of Parliament regulating joint-stock companies?—it did not allow the Directors to take more than 10s. per cent. on the amount of shares prior to provisional registration—and that was one reason why so few companies were completely registered, as compared with those provisionally registered; for, as on 20*l.* shares, the Directors could only in the first instance take a deposit of 2s. per share, they did not get a sufficient hold of their shareholders to bind them to the company. One thing he would ask was, had the law succeeded? Had they not heard accusations of swindling and odium being fixed upon the entire body of companies? Why did they not get monied men to take the position of directors of these companies? Because they had not limited liability—and when anything disgraceful was heard of, it was found that these people, who ought to have done their best to relieve it from its difficulties, had transferred their shares to Jack Styles or Jim Nokes, in order to avoid their liability. Under a system of limited liability that would not occur, but they would have more of the stern hard justice of which they had heard so much, both to the shareholders and to the public. Again, in winding up the affairs of a company which could not proceed, the system of limited liability would prove of the greatest use. He would give them an instance of this in the case of two companies projected with similar objects, one of which was to be chartered, and the other not. During the period of the dreadful scarcity of coals for the Indian Seas, the Australian Coal Company was started on the principle of no charter—no company—and the capital soon came forward. Some inquiries of a more minute description having been made into the matter, it was found that there was no chance of the company succeeding, and they wound up with only 1s. per share deduction for the expenses. On the success which the company he had just mentioned had in obtaining its capital another company started with similar objects;—it was not yet wound up, and he understood that twelve times what it had cost the one would not suffice to meet the liabilities of the other. In shipping, again, there was limited liability; and it was said, that if there was no such limit there would be no shipping. He might continue to give them illustrations of the anomaly of the law, but he would content himself with now reiterating his opinion, that the present law worked iniquitously for the public, and that, with proper regulations against fraud, with limited liability, all classes of society would be greatly benefitted.

Mr. Wm. Hawes must begin by stating that he, like the first speaker, was also going to address them on the unpopular side of the question, but he thought he should not have much trouble in showing that the gentleman who had just spoken had altogether failed in his arguments. If he showed that in his observations the honourable gentleman was entirely wrong in his law—if he showed that no such thing existed in Cornish mining as limited liability—if he showed them that in conducting the business of Cornish mines no material extent of credit was taken—and that therefore, of course, there could be no liability under the partnership laws, he believed it would be unnecessary for him to do more. If, however, credit were taken, then he said that in the mining operations of Cornwall there was no such thing as limited liability for the shareholders, the system in operation being one in which the proprietors either paid any losses they might have made, or divided their profits.

Mr. Hill explained that there was a partnership liability for two months at a time.

Mr. Hawes observed that was just what he had stated. There was no credit beyond the two months; and if one account exceeded the other at the bi-monthly meeting the difference was paid or divided, as the case might be, and the accounts being closed any proprietor could at once withdraw from the partnership and terminate his liability,—the whole question revolving itself into this, that in Cornish mining no credit was taken. The hon. gentleman talked about a water company, and having to pay 7*l.* 12*s.* 6*d.* a-year for water rates, which was one-half more than the Company was entitled to charge, and that, if it were not for the law of unlimited liability, a company might be got up to oppose it; but the hon. gentleman forgot that this was a company acting under limited liability, and therefore proved more than he wished to prove, for it showed the injuriousness of a monopoly—but even under the present law, if the company referred to violated its charter, it would be easy, were it not for the compulsory powers required to make rates and lay down pipes, to form a company to oppose such extravagant charges. The hon. gentleman said that if one man borrowed 5000*l.* at 5 per cent., whilst another obtained a *commandite* partner with a like sum, that the latter would be in the best position, because he would not owe anything. But, even with a law of limited liability, a party advancing capital might withdraw it at the end of three or four years—taking also full profits in the meantime—whilst if the money had been supplied by a friend anxious to promote his welfare, it would only be subject to the interest of five per cent; and the only difference would be, that the gentleman with a partner, whose liability was limited, would have to pay the full amount of profits derived from the money, whilst the other would only pay 5 per cent. Now, the question would resolve itself entirely into this—on what terms could money be borrowed, and whether it would be more advantageous to give those terms or to have a partner, who, whilst he took full profits, was only liable for a certain amount of loss? Seeing that the hon. gentleman who read the paper which gave rise to this discussion had just entered the room, he would make a few observations upon it, which he had not otherwise intended to do. The hon. gentleman, after reading his paper, said that he thought he had exhausted the subject, but he (Mr. Hawes) could not help feeling that, after all the discussion which had taken place upon it during the last three or four years, the hon. gentleman had not brought forward a single new fact or argument in support of his premises. The hon. gentleman read the report of the Committees of the House of Commons and the evidence which had been given, but he brought forward no new facts or additional evidence in support of his views. It was true that Mr. Slaney dwelt very strongly on the advantages of the law of *commandite*, particularly for working men. It was only in France that associations of working men *en commandite* appeared to exist, and there the system was not introduced until after the Revolution, and the lamentable failures consequent thereon were now a matter of history. He could not find that it had existed either in the United States or any other country in Europe. With regard to the question of capital, he believed that nothing could be more injurious than the forced aggregation of capital for retail trade. Let capital be brought together by all fair

and honourable means, but let not the law hold out temptations to investing small sums in speculative trades *en commandite*. If they could get together 20 or 30 working men to join *en commandite*, few of their investments would exceed 100*l*., and all parties would want to interfere in the management, and he could conceive nothing more injurious than such a proposition. But let us suppose a *commandite* partnership beginning business next door to a well-established trade, conducted by *one* person, whose whole capital, accumulated after years of labour, was liable for all his debts and losses. Could not the *commandite* firm ruin this respectable man, without ruin to themselves? Could they not get his trade by an investment or loss of capital, which, divided among several, would be of no importance? Unless, then, you were prepared to allow individuals, each one to limit their responsibility, and to give notice that they would not pay their debts if they exceeded a certain sum, you could not maintain the principle of *commandite* as applied to ordinary trade and commerce. There was another point of view in which he wished them to look at the question, viz., as it affected transactions with foreign countries. Did they not know that English bills commanded a higher rate of exchange, and that English paper was more easily negotiable than that of any other country;—and why? Because abroad the law of *commandite* prevailed, and no one could say who was liable on a bill, whilst here every endorser was equally liable, and foreigners therefore always sought for English bills. He would ask them had American commerce increased in the last few years more rapidly than that of Canada,—there was however no law of *commandite* in Canada. Though both the systems might have some good points, there was no reason to believe that the commerce of England or of Canada would be increased by an alteration in the laws of partnership, so far as related to the introduction of limited liability, and, therefore, he was opposed to any tampering with them. He must say that he thought it would be impossible for working men to enter into companies founded on the law of *commandite* without great restrictions, which would go far to limit its adoption. What they most wanted was the removal of all restrictions from the employment of labour—to the industrious application of which many of our greatest merchants owed their wealth, and by which it was in the power of the smallest to follow their example.

Mr. WEBSTER said if they wanted an argument against the present system, and in favour of that advocated by Mr. Hill, one might be found in the statements of the hon. gentleman who had just resumed his seat, which wholly relied for their strength on the sufficiency and supremacy of the monopoly of capital now existing in this country. Now that was what he and those who acted with him were struggling against. He did not know how it could be considered an advantage, that if a monied man wished to support a man in business he must do so in the manner described, namely, by loans on adequate security, and with a preference to all others. He should have hesitated speaking on this subject, but that his professional occupations made him daily acquainted with the numerous round-about expedients and attempts which were resorted to for avoiding the consequence of the present partnership laws, by which ever so small an advance of capital might render a man liable for the whole of his fortune. The question had been argued as if unlimited liability was wrong—that was not the question—but whether limited liability was right. The two systems might and ought to co-exist. No one would question the pre-eminence of the commercial credit of this country. How could this be affected? He would not wish for anything which might lower it; but he believed that the introduction of limited liability would have the reverse effect. He was extremely sorry not to see Mr. John Duncan present on that occasion, because in his evidence on the patent laws he spoke in the strongest terms of the impediments to partnerships and the necessity for an alteration in the laws. He thought a clear distinction might be drawn between undertakings requiring credit simply as commercial operations, and the carrying on of business incident to manufactures. Another fallacy of the gentlemen who opposed limited liability, was to say that it would be unfair to give increased facilities for setting up in competition with brewers or bakers already established, and whose risks were known. Any one would lend capital for such objects if they were acquainted with the party wanting it. They did not wish for increased accommodation. It was not for ordinary business that any alteration was required in the law, but to promote true and legitimate enterprise, when the business was somewhat speculative and uncertain. He could not see why limited liability might not exist in conjunction with unlimited. There were some businesses to which the system of *commandite* was peculiarly applicable. The practice of many Insurance Companies, which pointed to the security of a paid-up share capital in connection with the mutual principle, as an additional guarantee, was an illustration of the advantages to be derived from the *commandite* system, although that was not applicable to Insurance. It was beside the question to talk of philanthropy, and how best they could invest their money, so as to assist the working men to place their foot on the ladder of advancement. This appeared to be the object of the Dean of Hereford. He was convinced there were thousands of persons who would assist the industrious with money, if they knew how to do so without rendering themselves amenable to the partnership laws. It was useless to talk of loans to such persons on adequate security—the object being to afford such persons the means of creating property which they might invest or employ on capital; there was a wide distinction between a loan on security and an advancement of capital, to be repaid out of the profits of the business. The anomalies of the English law showed the necessity for some change. A share of the gross proceeds of a business, or of the earnings of a boat, or of the proceeds of a whaling voyage, or of the copyright of a work, or payments in proportion to the profits of a business, did not create a partnership. These and other obstructions showed how repugnant to common sense the principle of unlimited liability in many transactions was felt to be. When they talked of stern old English justice, they should recollect that the system of limited liability was old, having been introduced in Italy in the year 533. The French adopted it in 1673, and it was now principally in use in that country and the United States of America, where it was rapidly progressing. Louisiana was the first state to adopt it, and it had since extended itself to Illinois, Florida, and Kentucky, the latter states only having taken it up so late as 1847-50. This was the only instance in which the United States had adopted the laws of France instead of those of England, and it must be admitted that the Americans were quite as enlightened as the inhabitants of any other country. There was, perhaps, not a commercial country in the world where the means could be so readily obtained, and the facilities were so restricted, in carrying out legitimate speculation as this. Take the case of water companies—no matter how a district was situated, they could not start a competition company without an act of parliament or a charter. The telegraph companies, from which so much benefit was derived, had long striven for incorporation, and at last obtained the privilege by a charter from the Board of Trade. He would with their permission now refer them to America, and read a few lines from the report of Mr. Whitworth, the Commissioner to the New York Exhibition, which showed distinctly the great care that was taken in America to foster and encourage manufacturing and trading industry, and that something ought to be done in this country, not for encouraging competition with the brewer or baker, but to afford new outlets for enterprise, whereby the natural wealth and the general prosperity of the country might be extended and increased. If they

had limited liability that facility might be afforded, and all classes would reap the benefit. He would conclude by repeating what he had already stated, that the question was not whether unlimited liability was wrong, but whether limited liability was not right, and a proper system to be established in this country, in certain cases, under proper regulations.

Mr. JOHN DILLON was (perhaps with some hesitation) in favour of allowing limited liability. He attached less importance to the subject than many did. On the one hand he believed that the advantages were much exaggerated, and on the other he did not join in the fears entertained by many on the subject. He was in favour of removing all restrictions on trade, and the introduction of limited liability might lessen feelings of distrust on the part of the working classes. The practice of limited and of unlimited liability might exist together; companies or partnerships with limited liability would find their credit less, and labour under disadvantages which they did not now foresee. Of course, in legalizing the law of commandite, he would, as far as possible, provide a safeguard for the public. All such companies should be registered, and other restrictions might be necessary. It might be advisable to adopt a practice existing in some American companies to call up 50 per cent. of the subscribed capital; so that, if a man had paid in 1,000*l.*, he should be held liable to creditors to the extent of another 1,000*l.* He did not propose this at present, but he felt that so important an alteration in the law should not be allowed to take place until its details had been considered with great care and attention. He did not think that the alteration would prove of such advantage to the working classes as some seemed to imagine; but the very fact that the alteration would remove an injury under which the working man fancied he laboured, would be a sufficient reason with him for supporting the introduction of the law of limited liability. After all, he believed that limited liability as to capital would not enable the parties to cope successfully with the great brewers, &c.; they would find that skill as well as capital was needed, and he thought they would be very much in the position of the man who bought the fiddle, thinking thereby also to obtain the talent of the musician.

Mr. J. P. GASSIOT, F.R.S., was sure that there was not a commercial man who would not in a great measure agree with Mr. Dillon, that capital was not afraid of capital. He knew what capital and skill were in manufactures, and he thought no single person need fear the combination of 100 persons, of small capitals, united in a partnership to carry out any given object. He believed that the advantages anticipated from commandite were greatly overrated. What Mr. Dillon had stated relative to safeguards he perfectly agreed with, for should limited liability become law, they would require protection against frauds, and the fraudulent creditor would want as much looking after as the fraudulent debtor. They must, he repeated, punish the fraudulent creditor as well as the fraudulent debtor, through the agency of the police and the judge. The law of commandite in France was backed by a sound bankruptcy law, under which a person failing to meet his engagements might be sent to the galleys. It was not so here; the utmost that could be done was to refuse the bankrupt any but a third-class certificate, and a very severe punishment it was, as it prevented a bankrupt readily obtaining credit again; whilst in France, as he had said, the bankrupt might be sent to the galleys. He believed that the advantages expected to be derived from the alteration in the law were quite visionary. He should be glad to know from Mr. Webster how many manufacturers were likely to advance capital to working men to start in business for themselves. He thought it was cruel to hold out such hopes to the working classes, as it turned them from habits of honest industry; and instead of earning their 30s. or 40s. a week they fancied they were Arkwrights; the result being, that if they proved unsuccessful they wasted their time in the ginshop. The real question for them to consider was, whether it was desirable to introduce into this country a system which had not been proved to be successful on the Continent, and which, though he had no fear of its injuring the capitalist, he believed could not benefit the working man.

Mr. TRIPP said there were three things requisite success in commerce—capital, skill, and labour. There was not a man present who would not hold up his hand against any restriction on the free use of labour. He believed there was not one present who would urge an argument against the free use of skill, and he should like to know, then, why they should not have in commerce the free use of its most essential element—capital. Why should labour and skill be free, and capital not free. The gentleman who spoke second alluded to their having unlimited liability in the mines of Cornwall, which he understood to be fenced with or denied by the gentleman who followed him. Now they were gathered together in that room to contribute facts that they could substantiate upon the question before them, and not to show their skill as debaters. He knew, from being a resident in the district, that in Cornwall they annually raised 1,000,000 tons of copper, which they sold to the smelter, who, having smelted it, sold it to the manufacturer. The mining operations in Cornwall were partly conducted on credit, on the system of limited liability, and partly by cash. Where they conducted their business on credit, they had bi-monthly meetings to settle their accounts, and either divide the loss or the profits, as the case might be, amongst the proprietors. If at one of those bi-monthly meetings any one saw cause to be dissatisfied with the position of the mine, he could at once withdraw, and his liability was limited to his share of the loss already incurred. In smelting, however, they had not limited liability, or they could reduce the price of copper nearly 25 per cent. If they had limited liability, smelting companies would be formed, but as it was, smelting was a complete monopoly. At present, when there was a parcel of copper to be sold, six or seven smelters joined together and would only give their own price for it, which the miner was obliged to take. If they had limited liability the inhabitants of Cornwall would form smelting companies, which would be alike beneficial to the miners, the manufacturers, and the public. He repeated they now had free labour, free skill, and he should be glad to know why they might not have free capital.

Mr. CAMPIN supported the views taken by Mr. Webster. He knew, from his position as a patent agent, that the law, as it now stood, prevented many valuable inventions being brought before the world, for the want of means on the part of the inventors to try experiments. The sums required were generally small, and parties who would otherwise advance them, were indisposed to do so for fear of being drawn into a partnership with an unlimited liability. Whether all inventions were good or not, he thought that the Society of Arts was particularly interested in the promotion of an alteration in the law which might lead to their value being tested and determined.

Mr. LEONI LEVI thought this question was one of such great importance to the Society and to the public, in every point of view, that he should like to ask the Council to appoint a committee to report upon the subject. He believed the question was nearly exhausted so far as that evening's discussion was concerned, but he was sure a report of the Society upon it would carry great weight, more especially if the opinion of the Institutions in Union with them was obtained upon it.

The CHAIRMAN reminded Mr. Levi that this was only an adjourned meeting, for the purpose of completing their discussion, and the subject to which he had alluded could not be taken into consideration, without calling a special meeting for the purpose, which he was afraid it was too late to do at the present period of the Session.

Mr. Slaney then rose to reply. He regretted he had not been present at an earlier period of the evening, owing to an engagement made some time before the adjournment. Since he had been in the room, however, he had heard opinions expressed on both sides of the question with great skill and judgment, but he must be allowed to say that he had heard nothing to alter the opinion he had expressed in his paper, and he would as briefly as possible tell them why he said so. It appeared to him that there had been great truth spoken, and, perhaps, some mistakes made by the advocates on both sides of the question. Some persons appeared to conceive that if they had limited liability the working men would rashly rush into hazardous speculations, whilst others believed that they would never take advantage of the alteration of the law. He did not think with either of these parties; he was of opinion that, as the principle was admitted of freedom of action, of skill, and of thought, they should also have freedom of capital, and, if they had freedom of capital, that it would be prudently taken advantage of. He believed there was an immense capital in different hands which would be brought to light, if parties saw that they had an opportunity of using it with safety. It was no answer to say that the proposed alteration in the laws might lead to fraud. It would be their duty to take every precaution against that, whether they adopted it from the steady Hollander or the shrewd American. They might make every improvement they could upon those laws, but would any man tell him that capital in moderate sums could now be safely employed in public undertakings. In the first instance, if a company were formed to carry out any useful invention, every member of it became liable for the debts, to every shilling of his fortune and every acre of his property. Would any prudent man run the risk of a penalty like that? In the next case, if they entered into a partnership of the nature he had stated, and any dispute arose among the partners, it could be settled in no other manner than by going to the Court of Chancery, the cost of which might be enormous, and the delay interminable. What reason had they to suppose that an alteration of the law would lead to fraud; it did not appear that it had done so abroad, and even the recent commission on the subject admitted that some alterations might be made, giving greater facilities for obtaining charters. It had been argued by some as if the question affected only the working classes. Were not the middle classes interested in everything connected with the commerce of the country? If three or four large capitalists could join together advantageously in commercial speculations, why could not a larger number do so? and why should the people be unjustly deprived of a blessing, because there was some fear that the law might be abused by a few? He believed that such a measure would be the stepping-stone to a large increase in the number of intelligent manufacturers. He had that day received a letter from his friend Mr. William Chambers, of Edinburgh, who stated that, during the past year, he had an opportunity of seeing in America how readily the middle classes and the working men took up shares in measures of local improvement. Upon one occasion he happened to be in a town where they had what the Americans called a "riot and a row," and there were fears expressed that they would destroy the gas pipes; but one who knew them well said "no, they will never do that, for nearly every man in the town is a shareholder in the gas company, and, therefore, a self-appointed constable for the preservation of his own property." He believed that, whilst they put every check in the way of the laws being abused, they ought to give every encouragement to the employment of capital in local improvements, for exactly as a man became interested in a house, or in local establishments, would he become contented and industrious, providing for the protection of the district the cheapest and most efficient police. Whilst he was in parliament, he saw many useful measures delayed for a time, but gradually and surely making their way until they were carried; and he trusted and believed that he should yet live to witness the success of this measure.

The Chairman, on behalf of the meeting, gave a vote of thanks to the honourable gentleman for his valuable paper, read on the 31st ult., and the meeting separated.

The Secretary announced, that the General Meeting to receive the Council's Report and the Auditors' statement of the receipts and expenditure for the past year, would be held on Wednesday, the 14th instant.

Lord Hobart handed in to the secretary the following statement, as the time at the disposal of the meeting did not admit of his making these observations personally:—

If the question at issue in regard to the Law of Partnership liability were this,—Does the common law, in deciding that a person is liable to the full extent of his property for the debts of the company to which he belongs, decide justly?—I should answer it in the affirmative. It seems to me, though the question is a very difficult one, that the decision is just which makes a "Shareholder," in the present sense of the word, *i.e.*, a person who is professedly a member of a Partnership—liable in all his property for its debts. Supposing that the "Shareholder" is a *Director*, *i.e.*, the actual contractor of the debt, I have endeavoured to show, in some Remarks which I published a short time since on the subject, that there were the same grounds for making him liable without limit for such debts, as there are for making an individual trading on his own account so liable for his own debts. Supposing he is not a Director, it may be said that, not having been a Contractor of the debt, but merely a subscriber to the concern—he ought not to be held liable for the debt. But to this the reply is—that his name is appended to a deed of settlement and other documents, and registered in the books of the company as one of its Shareholders,—and therefore that the Directors must be considered as having been his *Agents*, and himself held responsible for their acts.

It therefore seems to me that, under present circumstances, the law is right when it decides that, as associative undertakings are at present constituted, the shareholders in them are liable, without limit, for the debts incurred by the associations to which they belong. But while holding this opinion, I am nevertheless satisfied that a very grave error, and one which has the most disastrous effects upon the public interest, is committed by the law in regard to the liability of those who provide funds for carrying on commercial undertakings. Under the present state of the law upon the subject, any person who may furnish money to an individual or a partnership on condition of receiving a share in the profits, or (as it may be termed) an interest varying with the results of the undertaking, is held liable in the whole of his property for the debts incurred in respect of the undertaking. There seems no sort of foundation in reason for such a state of the law. In the case of an ordinary loan at a fixed interest, it will at once be admitted that the lender ought not to be liable for the debts of the borrower. Now a loan or contribution of the kind above-mentioned differs from an ordinary loan in that the lender is on the one hand entitled to his share of the profits, and on the other hand would have no claims on the borrower if the money which he lends him were lost. But these points of difference are not in any way such as to create any grounds for unlimited liability in the case of the lender on such terms, which do not also exist in the case of the ordinary lender. It is said, I believe, in reply, that if a person is entitled to a share in the profits he ought also to share in the losses of the concern. The answer is—that he does share in its losses, since if the money is lost he has no claim upon the association for the restoration of it; and if the law goes beyond this, and makes him liable in the whole of his property for the debts of the assocation, it

acts unjustly. The question which the law has to decide is—what was the implied contract between the contributor of the money and the person or persons receiving it? It is clear that the implied contract between them was that the contributor should share in the profits, and should also bear the losses so far as *the amount of his loan or contribution would go, but no further.*

I think, then, that justice imperatively requires that a change such as that I have mentioned, should be made in the law of partnership liability, and I also think that if such a change were made, a very great and important stimulus would be given to commercial enterprise, and therefore to the productive industry of the country. It is true that there would be no more inducement than exists at present for persons to become shareholders in unincorporated companies, but the practical result to the commercial interests of the country would be the same as if a very great addition had been made to that inducement. Instead of being carried on by companies of shareholders, associative undertakings would be supported by persons contributing funds in the manner above-mentioned, who would only differ from shareholders (as the term is now understood,) in that they would be entitled to no part in the management of the undertaking. Should it be said that, if the difference between such persons and shareholders is only nominal, there must be the same grounds for holding the former personally liable for the debts of their company as there are for holding the latter so liable, I answer—that the question to be decided by the law being one as to the nature of an implied contract, becomes a question in the solution of which a name or designation is of vital importance. In determining the nature of a contract, it is obviously of the greatest importance to know under what designation, or in what character, the parties to the contract concluded it. In determining whether A is to be responsible for the actions of B a main point for consideration obviously is, whether A by any oral expression, or written instrument, authorized B to act on his behalf.

The principle of the change thus proposed is that on which the French law of "commandite" is founded. The French law appears to admit the principle that any person who is a party to the contracting of a debt, whether as a director, or shareholder in the ordinary sense of the word, ought to be personally liable for the debts of such company; and it also admits the principle that the mere fact of a person having furnished money for the purposes of an undertaking, on condition that he participates in its profits, ought not to render him liable for the debts incurred in respect of it. It therefore divides the partners into *gérants* who manage the undertaking, and *commanditaires* who furnish the money and participate in the profits, but who are expressly excluded from any part in the management. Thus the commanditaires are in effect a class of lenders of money such as that which would arise if the proposed change were made in our law:—a class of persons who provide funds for the purposes of the undertaking on condition of a share in the profits, and at the risk of the loss of the sums which they contribute. It may, perhaps, be a question, whether the introduction of a measure similar to the French law of commandite would be the best mode of effecting the proposed change in our law. The root of the evil is the maxim of English common law, that a "share in the profits constitutes responsibility," and the requirements of the case would, as it would seem, be fully met by some enactment, which would contradict this maxim, *i.e.*, which would simply provide, in technical phrase, that persons should not be held liable for the debts of a partnership because they participate in its profits. It seems probable, however, that a measure of this sort might not, in the first instance at least, be so well understood by the mercantile community as to induce them to make associative investments of capital under it in the manner above-mentioned; and that the introduction of the *commandite* law into this country would be more effectual for the encouragement of commercial enterprise. On the other hand, it may be said that although such a measure would be opposed in principle to the maxim of our law, above referred to, and would put an end in a great degree to its injurious effects, it would still leave that maxim in operation. The question, however, as to the best mode of carrying into effect the proposed change would be one for after-consideration.

GENERAL MEETING.

WEDNESDAY, JUNE 14, 1854.

The General Meeting to receive the Report of the Council relative to the proceedings of the past year, and the Auditors' statement of Accounts, was held on Wednesday the 14th inst., Harry Chester, Esq., Chairman of Council, in the chair.

The following candidates were elected ordinary members

Prescott, W. G., F.G.S. | Robinson, Charles Burt.

The following Institution has been taken into Union since the last announcement

362. Kendal, Mechanics' Institute.

REPORT FROM THE COUNCIL TO THE SOCIETY, ON THE CLOSE OF THE ONE HUNDREDTH SESSION.

In compliance with the terms of the Charter, the Council presents at this meeting a report of the proceedings of the past year, and of the financial position of the Society.

The hundredth year of the Society's existence is now brought to a close. At the commencement of the session, the Chairman, in his opening address, adverted to the leading facts in the Society's history; it is, therefore, unnecessary here to recapitulate them. Indeed, to enter into a more detailed account of all that the Society has done, in furtherance of the objects for which it was instituted, would be out of place on the present occasion, and would occupy too much time. To make such a history complete, would involve the abstracting of all the volumes of the Society's published transactions, exceeding fifty in number.

The lapse of 100 years has necessarily varied the Society's modes of operation, but its original object, the Encouragement of Arts, Manufactures, and Commerce, has been constantly kept in view; and at no other time was the Society more active and energetic than it is at present, more extensive in its aims, or more possessed of the confidence of the public.

The weekly evening meetings have, it is believed, more than equalled those of former years, as well in the importance and general interest of the subjects brought forward, as in the character of the papers and the practical value of many of the discussions which have ensued on their reading.

The Session opened with a paper by Mr. Charles F. Stansbury, "On Machines for Pulverizing and Reducing Metalliferous Ores," which gave a good historical account of all the known

sources from whence gold has been obtained, and of the primitive methods and processes adopted by various nations for winning the precious metal, down to the present time, concluding with a detailed account of Berdan's machine. This was followed by a paper "On the Consumption of Smoke," by Mr. A. Fraser, which described the successful application of Jucke's furnace to the boilers and coppers at Messrs. Truman's brewery, to which he is the engineer. This led, as might be anticipated, to a very animated discussion, which was continued throughout a second evening, when numerous other contrivances were explained. It is right to add that in the case of two—those of Hazeldine and Hall—Mr. G. F. Wilson, of Price's Candle Company, certified that they had been in successful use at that establishment, as well as Jucke's. Later on in the Session, Dr. Neil Arnott, F.R.S., read a paper "On a New Smoke-Consuming and Fuel-Saving Fire-place," which is a modification of that known some 30 years back as the Cutler stove. By the addition of a throttle-valve or damper at the mouth of the chimney, the passage of air through the fire is regulated, combustion is slower, the quantity of coal consumed is reduced, and, at the same time, all the heat is thrown into the room, instead of being allowed to pass up the chimney. Whilst on the subject of the use of coal, Dr. Glover's paper, descriptive of a "New Safety Lamp," may not inappropriately be alluded to. The single glass cylinder of the Clanny lamp is here replaced by a double cylinder. The air to feed the flame enters at the top, through wire gauze, passes down between the cylinders, and so keeps the outer one cool. In the class of Mechanics must also be mentioned two papers, one by Mr. Joseph Glynn, F.R.S. (who contributed greatly to the value of the discussion on the "Consumption of Smoke,") on "Water Meters," and the other, by Mr. B. Fothergill, "Description of Taylor's Water Meter." An instrument of this kind, to be efficient, must be capable of acting under varying heads or pressures, and must not be liable to get out of order. In the discussion on this question, Mr. D. Chadwick and Mr. C. W. Siemens, introduced to the notice of the Society meters of their invention, displaying considerable ingenuity and novelty. As an illustration of what is being done by our Transatlantic brethren in labour-saving machines, Mr. C. T. Judkins's paper "On Stitching Machines," may be taken as a type. The comparative scarcity and the dearness of labour in that country causes the minds of ingenious men to be exerted, more perhaps than in the old country, in devising means for substituting mechanism for human labour; and there, possibly, such ingenuity finds a readier market. The Stitching Machine seems capable of operating both on a delicate fabric and on stout leather—for harness, &c.; and, although for the finer kinds of work there may be some prejudices to overcome, and some hesitation at first in adopting it, there can be no question but that even in its present state, it is quite available for many of the lower classes of work; and, doubtless, it will create for itself work which never could have been done by hand.

In Agriculture Mr. Mechi has presented his Third Balance-Sheet, exhibiting the results of his operations at Tiptree Hall Farm. In this paper attention was forcibly called to a new method of irrigation, with liquified manure, very much diluted, and also to the advantages likely to result to agriculture from the general application of steam to cultivation. Analogous papers were those by Mr. Horace Green, "On Pettitt's Fisheries Guano," and by Mr. J. B. Lawes, "On Fish Manure as a Substitute for Guano." That fish can be applied for this purpose there is no doubt, but whether such manure can be prepared and sold at as a cheap rate as guano and other manures, already in the market, has yet to be determined. "The Importance of a Correct System of Agricultural Statistics" was treated of by Mr. Leone Levi, who narrated the plans which had already been adopted for this purpose by private individuals, viz., Mr. Sandars and Mr. Hodgson, of Liverpool, by the Highland and Agricultural Society of Scotland, for the counties of Roxburgh, Haddington, and Sutherland, and by the Poor Law Board for the counties of Norfolk and Hampshire. Mr. Levi strongly urged the collection of agricultural statistics for the whole empire, and considered that it behoved Government to create a permanent and extensive machinery to carry out the plan. The principle advocated in this paper was very generally supported by the different speakers, and especially by Mr. Jadis, the Comptroller of Corn Returns, by Mr. J. Caird, Mr. S. Sidney, Mr. Morton, Professor J. Wilson, and others, who, however, differed somewhat as to the details. On the other hand, it must be confessed that there were those who looked upon such a scheme as having a tendency to interfere with the ordinary operations of trade.

In Commercial matters may be cited the very elaborate paper by Dr. Forbes Royle, F.R.S., "On Indian Fibres fit for Textile Fabrics, and for Rope and Paper Making," which was rendered all the more valuable by coming at a time when our manufacturers were already experiencing considerable difficulty in obtaining supplies of raw material to carry on their business. Dr. Royle showed most conclusively the vast resources of our Indian possessions for these purposes, and that many of the fibres alluded to are possessed of superior strength—as for instance, the Rheea fibre of Assam, to Russian hemp and flax. It is satisfactory to report, as the result of that paper, that some of the money which used formerly to

be sent to Russia, has now been turned to India, and it may confidently be expected to lead to the opening up of a very large trade, for which Dr. Royle has zealously laboured for so many years. New Zealand flax also claims some notice, the Society of Arts having been requested by a kindred Society at Wellington, to obtain information as to the best modes of preparing and dressing it for the market. Part of this information has already been published in the Journal, and some further details will shortly appear. The paper by Dr. Buist, "On Some of the Undeveloped Resources of India," also glanced at the materials spoken of at length by Dr. Royle, but it dwelt more particularly on the means by which commerce might be extended in our Indian dominions, by giving to that country greatly increased facilities of inland transit, and by raising the general intelligence of her people. The Swellendam Agricultural Society, at the Cape of Good Hope, being anxious to ascertain the possibility of introducing into that colony the Long-haired Angora Goat, H.R.H. the President requested the Society's co-operation in the matter. The opinion of our leading brokers and manufacturers, importing or using Angora Goats'-wool was therefore asked, and their replies will be found embodied in a report which was published in No. 52 of the Journal. His Excellency Colonel Sir William Reid, Governor of Malta, has also communicated the results of the introduction of the Eria, or Bombyx Cynthia of Assam, into Malta and Italy, and further particulars will shortly appear.

Of the application of Art to Manufactures, Mr. W. C. Aitken spoke in his paper "On Ancient and Modern Metal Working," in which reference was also made to the newly-discovered Art of Nature Printing. It is due to Dr. Ferguson Branson, of Sheffield, to state that this discovery was first communicated to the Society by that gentleman, in the year 1851; but he appears then to have gone no further than to produce imperfect specimens on paper, in an indirect manner. Mr. Aitken, on the other hand, ornamented metals by this process direct, and from the hard metal so engraved obtained impressions by means of the ordinary copper-plate printing process. The priority of this latter invention has since been claimed for Mr. John Smith. The large and splendid collection of Natural History Illustrations produced in this manner, and presented to the Society by the Imperial Printing Press at Vienna, will be in the recollection of the members, as will also the delicate Botanical specimens more recently brought out in this country by Messrs. Bradbury and Evans. Whilst on the subject of Illustrative Art, two communications which have appeared in the columns of the Journal should be mentioned—one "On Soap as a Means of Art," by Dr. Branson, the other "On an Electro-Magnetic Engraving Machine," by Mr. W. Hansen, of Gotha,—as involving new and distinct principles, which may hereafter lead to important results.

Mr. Waterhouse Hawkins's paper "On Visual Education as applied to Geology," gave an account of the marvellous restorations of extinct animals at the Crystal Palace, made under his directions, with the aid and counsel of Professor Owen, F.R.S. A series of papers in the Journal, "On Education as a Science and an Art," by Mr M. A. Garvey, gave a philosophical exposition of the principles on which the mind should be trained and brought to receive instruction.

The paper by Mr. W. Miller, "On the Decimalization of Coins and Accounts," entered at length into the history of our currency from the earliest times down to the present period, and concluded by advocating the adoption of the Decimal Currency, with the pound sterling as the unit, the other coins in the scale being nearly identical with those recommended by the committee of the House of Commons last year, of which Mr. W. Brown M.P., was the chairman. The speakers at the meeting seemed to be almost unanimously agreed that the time had now arrived when the decimal coinage at least should be carried out. Mr. T. Webster's paper, "On Laws relating to Property in Designs and Inventions," led to a very animated discussion, at three successive meetings, as to the advisability or non-advisability of granting any such protection, and although on this point the speakers were diametrically opposed, nearly all agreed that improvements in the administration of the law might still be made. The subject treated of by Mr. R. A. Slaney (late M.P. for Shrewsbury), "On Limited and Unlimited Liability in Partnerships," has led to a very valuable discussion amongst eminent commercial men, as the report in this week's number will show; and here again much diversity of opinion exists.

The concluding paper of the Session was by Dr. T. K. Chambers, "On Industrial Pathology, or the Injuries and Diseases incident to Industrial Occupations." This, it is to be hoped, is but the forerunner of many communications on the same subject, so that the efforts of the Committee on Industrial Pathology, of which Dr. Chambers is a member, may not be made in vain. Many improved modes of conducting handicrafts may, by these means, be devised and adopted; and those now known to be prejudicial and hurtful to health discountenanced and abandoned. The paper by Dr. Stenhouse, F.R.S., descriptive of a "New Charcoal Respirator," describes one of those safeguards, of which many are needed, that may be used with advantage by all those whose calling leads them occasionally into noxious and infected places. The deodorizing and disinfecting properties of charcoal are now well known, and a thin layer of it is quite sufficient to

purify and render innocuous the fumes of most powerful acids.

This outline will serve to show that though the Society has, within the last few years, extended its operations in other directions, hereafter to be alluded to, yet that these extensions have tended to increase rather than diminish its usefulness within its former limits. The rapid publication of the papers and discussions, which are printed at full length within two days after they are delivered, must have a beneficial effect; and inthis respect the Society can claim precedence over every other Society or Institution.

The disastrous disputes between employers and employed which have been so prevalent during the past year, and especially in the cotton manufacturing districts, induced the Council to hope that some benefit might arise, if not directly, at least indirectly, by having a discussion upon the more vexed problems of the labour market. Accordingly, they held a Conference on the subject of Strikes and Lockouts, over which Lord Robert Grosvenor ably presided, and which was attended by a number of persons well qualified to represent the conflicting opinions which are entertained on these remarkable phenomena of Industrial life amongst us. A resolution was unanimously adopted at that Conference in favour of a law of Limited Liability in Partnerships, as tending to diminish the prevalence of such deplorable contests. It is also worthy of remark, that on the week after the conference was held, the Preston masters determined to open their mills, a course which, being perseveringly pursued, has, happily, restored the manufacturing establishments of the town to their usual activity.

The Council, during this Session, collected and embodied in the form of a Report, which was published in the Society's Journal, all the information which they could obtain on the operation of the Paper Duty. A memorial founded thereon was prepared, and a deputation to the Chancellor of the Exchequer, for the purpose of presenting it, contemplated, but the disturbed state of Europe led the Council to think that a less formal mode of procedure was preferable, and accordingly the memorial was transmitted to Mr. Gladstone privately by the Chairman.

During the course of the Session the Council has awarded to Mr. Leone Levi, as the author of the best published work on Jurisprudence, for his work on the "Commercial Law of the World," the Swiney Prize of a Silver Goblet, value one hundred pounds, and one hundred pounds in it.

The General Union of Institutions, which was formed in May, 1852, continues steadily to increase, and during the past year 84 have been added to the list, the Union now numbering 354 Institutions. In all its measures for the improvement of those bodies the Council has endeavoured to develope their inward strength. The Council has furnished them with an arranged list of Lecturers, each of whom was nominated by one or more of the Institutions themselves. Two collections of Photographs have been formed and lent to the Institutions in Union, and, with other objects of interest supplied by the Society, have become the nuclei of many successful Local Exhibitions. The Council has also effected arrangements with a large number of the leading publishers for supplying the Institutions with Books and Maps at a considerable reduction on the published prices. Under these arrangements, though they have been in operation only since the month of last October, purchases to the amount of £862 8s. (reduced prices) have already been effected by the Institutions. In order to stimulate the formation of Classes in Institutions, and thus render them more effective as educational establishments, the Council has been occupied in devising a scheme for the examination of members of such classes, and for granting to them certificates of attainment. It is believed that such a system is likely to be attended with important results, if the scheme be cordially responded to by the Institutions themselves. An outline of the proposed plan has appeared in the Journal. It will be laid before the representatives of the Institutions at the Third Annual Conference, and, if approved of by them, the Council sees no difficulty in obtaining the aid of a Board of Examiners, whose names will command the confidence of the Institutes and of the Society.

Mr. W. Hutt, M.P., one of the Vice-Presidents of the Society, recently brought into the House of Commons "A Bill to afford greater facilities for the Establishment of Institutions for the Promotion of Literature, Science, and the Fine Arts, and to provide for their better regulation," which had been prepared by the Council, in accordance with the wishes of several of the Institutions.

The Council has great pleasure in announcing that the Chambers of Commerce in the important mercantile towns of Hull and Liverpool, have entered into union with the Society. The cultivation of intimate relations with those bodies throughout the country, is a point to which the attention of the Council will be earnestly directed.

The Council regards with great satisfaction the improved character of the Journal. During the Session it has been found necessary to give an increased number of pages, so that the Papers read at the evening meetings, and the Discussions upon them, might be printed at length instead of in abstract only, as was previously the case. It is believed that this alteration adds considerably to the value and interest of the Journal. The change from the former weekly proceedings of the Society to the

present Journal, though undertaken with due consideration, could, in the first instance, only be considered in the light of an experiment. Experience, however, has fully justified the change, and though the Council hopes to see still further improvement in the Journal, it is obvious that it has already become an important element in the Society's action, and cannot fail to exercise a considerable influence in promoting its objects. The Council takes this opportunity of expressing its thanks to those members of the Society, and others, who have given assistance to the Journal by the communication of papers and correspondence in its pages.

In the Report at the close of the last year, it was stated that with the assistance and sanction of the Royal Commissioners for the Exhibition of 1851, the Council had undertaken the formation of a collection of animal raw produce and manufactures, as a first step towards the carrying out of the comprehensive scheme of the Commissioners for the formation of a Trade Museum, and that Professor Solly had been charged with the duty of making this collection. During the past year he has been actively engaged in the duties entrusted to him. The details of the progress already made will be found in his report, which is appended hereto.

The Council has appointed the Marquis of Blandford, Dr. T. K. Chambers, Mr. J. Simon, and Mr. T. Twining, Jun., a Committee on the subject of Industrial Pathology. They have been occupied in collecting information relative to the diseases and accidents incident to various branches of industrial employment. It cannot be doubted that a very considerable portion of such diseases and accidents arises from preventible causes, and the Council hopes that by calling attention to these subjects, the discoveries of modern science may be turned to account in rendering employments less unhealthy, and less liable to dangerous accidents. It is hoped that during the recess the Committee may be able to publish a special Report on one branch of the subject, viz.,—that relating to injuries to the eyes.

The Council has also recently appointed Lord Ashburton, the Dean of Hereford, and Professor Moseley, to be a Committee for Education in connection with Arts, Manufactures, and Commerce.

The Council desires now to bring before the attention of the members the great work which it has undertaken—and which it believes to be worthy the Centenary of the Society—the organization of an Educational Exhibition, in which will be collected the various educational appliances in use, not only in the different establishments in this country, but in many of the Continental states, and in the United States of America. The Society's premises not being sufficiently large for this purpose, the Council has thought it right to hire St. Martin's Hall; and it has every reason to expect that the Exhibition will be most successful, a very large number of applications for space to exhibit having been returned by intending exhibitors in this country, whilst many foreign countries have already announced their intention of sending contributions.

The Council, seeing that the establishment of this Exhibition would involve a very large expenditure of money beyond what it was prudent or right to charge upon the Society's funds, appealed to its members for subscriptions in aid of the undertaking, His Royal Highness the President having expressed his intention to subscribe 100*l.* towards it. The subscriptions, including that of His Royal Highness, now amount to £696. The Exhibition will be opened in St. Martin's Hall, on Tuesday, the 4th of July, with a *Conversazione*, at which His Royal Highness the President has intimated his intention to be present. The Council feels confident that such an Exhibition will not only afford means of comparison, which cannot fail to be of considerable value, to all engaged or interested in education, whilst at the same time, by calling the attention of the public generally to the subject, a stimulus may be given to the cause of Education. It is intended to have lectures and practical discussions on educational subjects during the period of the Exhibition. Several Commissioners have already been appointed by foreign Governments to visit the Exhibition, and report on its results, and there is reason to believe that a considerable number of foreigners interested in the subject will avail themselves of the same opportunity. The Council feels assured that it is to an improved education of the people we must look, if the Arts, Manufactures, and Commerce of this country are to maintain the position they have hitherto held.

The Auditors' Annual Balance-Sheet is already in the hands of the members, having been sent them in accordance with the bye-laws. The Council points with satisfaction to the steady increase in the number of members, 246 having been elected during the year. The Council cannot but congratulate the members on the corresponding increase in the funds of the Society, notwithstanding the many circumstances, political and otherwise, calculated to act injuriously at the present time.

It will be seen, on comparing the present statement with that of last year, that the receipts by annual subscriptions and life-members are 134*l.* 8s. in excess of those of 1853. The ordinary expenses of the Society have been, in proportion to the income, smaller than those of last year, although the balance of cash in hand is less. This is attributable to the award of the Swiney Prize falling during the present Session, and also to the extraordinary expenditure of 173*l.* 17s. 9d. in aid of the Trade Museum;—these items alone reduce the balance to an

extent more than equal to the difference of cash in hand—while a further sum of nearly 300*l.*, arising from Life Subscriptions, is reserved as a deposit account at interest.

The present liabilities of the Society amount to 833*l.* 0s. 11d., while the available cash amounts to 742*l.* 1s. 5d. The Government and other stocks remain unaltered, and the monetary prospects of the Society are most satisfactory.

AUDITORS' ANNUAL STATEMENT OF RECEIPTS, PAYMENTS, AND EXPENDITURE, FOR THE YEAR ENDING 31ST MAY, 1854.

Dr.

	£ s. d.	£ s. d.	£ s. d.
To Subscriptions for the year ending 31st May, 1854, viz.:—			
From Members and Institutions in Union with the Society:—			
Annual received	2948 7 0		
,, outstanding	690 15 0		
		3639 2 0	
Deduct due on former years	281 4 0		
Estimated not recoverable	135 17 9		
		417 1 9	
		3222 0 3	
Life Contributions		312 18 0	
			3534 18 3
To Dividends on Stock:—			
£3166 13s. 4d. Consols		92 4 6	
1969 10s. 6d. ditto, held in special trust		57 7 4	
388 1s. 4d., 3¼ per Cent.		12 4 10	
To Interest on—			
£100 Life Subscriptions reserved		1 17 11	
			163 14 7
To Special Objects:—			
Subscriptions in aid of the Educational Exhibition		668 8 0	
Less not yet received		333 19 0	
			334 9 0
To Royal Commissioners of Exhibition of 1851, on account of Trade Museum			100 0 0
Sale of Transactions			5 9
Advertisements		148 8 9	
Less amount due on former year		120 17 6	
			27 11 3
Journal (by overpaid last year)			1 0 0
Exhibitions			12 0 6
Institute Book Orders			866 8 0
			£5040 7 4

Cr.

	£ s. d.	£ s. d.
By General Establishment Expenses:—		
Rent, Rates, and Taxes	215 0 2	
House and Office	134 14 10	
Salaries, Wages, and Commissions	887 17 5	
Postage Stamps, and Parcels	142 3 3	
Stationery and Printing	176 4 11	
Advertisements	10 7 6	
		15[illegible] 8 [illegible]
By Special Objects:		
Swiney Prize	100 10 8	
Medals and Rewards	57 6 0	
Strikes and Lock-outs	37 12 10	
Trade Museum	273 17 9	
New Zealand Flax Prize	5 6 7	
		474 13 10
Journal	903 6 9	
Less charged to Union of Institutions	180 0 0	
		723 6 9
Exhibitions:		
Exhibitions, 1853—1854	53 11 0	
Paris Exhibition of 1855	1 1 6	
Educational Exhibition	106 11 9	
		161 3 9
Committees:		
Union of Institutions, including Journal, Postage, Printing, Stationery, and other charges	718 14 8	
Institute Book Orders	866 16 0	
Industrial Pathology Committee	18 1 9	
		1603 12 5
Evening Meetings	30 6 2	
Conversazione	46 5 11	
		76 12 1
Library, &c.		78 19 [illegible]
Repaid to Mr. Davenport, on account of subscription overpaid in error		2 2 0
Repairs and alterations	30 6 5	
One Year's Interest on Debenture of £1000.	43 13 8	
		74 0 1
		4710 18 [illegible]
By Reserved Fund		293 15 11
Excess of Income over Expenditure		35 13 [illegible]
		£5040 7 4

Dr. *Balance Sheet, 31st May, 1854.* Cr.

	£ s. d.	£ s. d.
To sundry Creditors, viz.:—		
To Tradesmen's Bills	£816 8 2	
Salaries and Commissions	16 12 9	
Debenture at 4½ per cent.	1000 0 0	
Interest on ditto	21 16 10	
		1854 17 9
To Trust Liability in respect of Government Stock (Consols) held for specific purposes, as per contra, viz.:—		
Set apart to answer:—		
Swiney Prize Bequest	1333 6 8	
Acton Trust	536 3 10	
Stock Trust	100 0 0	
Fothergill Trust	388 1 4	
	£2357 11 10	
By Excess of Assets over Liabilities		2629 6 7
		£4484 4 4

	£ s. d.	£ s. d.
By Cash in hand,		
At Messrs. Coutts and Co.	£357 13 5	
At Commercial Bank	56 15 11	
Ditto, Educational Exhibition Fund	314 9 0	
In the hands of Secretary	13 3 1	
		£ 742 1 5
By Dividends on £388 1s. 4d., 3¼ per cent. due 5th April		6 2 5
By Consols, £3166 13s. 4d., at 91		2881 [illegible]
By Deposit Account at Commercial Bank, (Life Subscriptions reserved)		300 0 0
By Subscriptions in arrear, £690 15s., estimated to be not recoverable, to the amount of £136 17s. 9d.		554 17 3
By Government Stock held in trust, applicable to specific purposes, viz.:—		
Consols	1969 10 6	
3¼ per Cent.	388 1 4	
		£4484 4 4

(Signed)

PETER GRAHAM,
MANUEL DE YSASI, } *Auditors.*
PETER LE NEVE FOSTER, *Secretary.*

PROFESSOR SOLLY'S REPORT ON THE COMMENCEMENT OF THE TRADE MUSEUM.

As a year has now elapsed since I undertook the duty of forming a collection of raw and manufactured animal produce for the Society of Arts, with the sanction and co-operation of Her Majesty's Commissioners for the Great Exhibition of 1851, the Society may with reason expect to receive from me some statement of the progress made: and with this feeling I have drawn up the following brief Report, and submit it to the Council:—

It will perhaps be well, in the first instance, to advert to the nature and objects of the collection itself, and the mode in which the Royal Commission is associated with the Society in the undertaking, and, in order to do this, I would beg leave to quote the following passages from a lecture which I delivered before the Society on the 21st of January, 1852, being one of the series on the Results of the Great Exhibition of 1851, suggested by H.R.H. the President:—

"These are, however, but a few out of many similar facts I may mention; they show plainly that, had the original objects for which the Society was established been strictly adhered to, and had its means enlarged in proportion to its utility, we should now have a most valuable record of the progress of human industry during the last hundred years, in fact, a great industrial museum of the whole world, not a mere magazine or store-house, in which natural productions and ingenious contrivances are piled up in endless confusion, where they may remain buried for ages, but a practical, useful, and well-arranged series, denoting past progress, and leading to future improvement—a place of reference, in which useful knowledge of all sorts would be accessible to every one, and at all times available for purposes of instruction.

"The admirable collection of Liverpool imports, contributed by Mr. Archer, to the Great Exhibition, though of course confined to articles at present known in commerce, and necessarily far from complete: is still a good specimen of the way in which such a series may be made to convey practical information. To be of real value, it should be far more extensive, and it should also be accompanied by much more copious information, and by illustrations of all sorts. For example, dye-stuffs should be placed side by side with samples of the colours they yield: and, in every case where practicable, the use of each substance should be illustrated. * * * The idea of a Museum of Industry is by no means new, for full thirty years ago S. E. Von Kees, who was then Chief Inspector of Factories in the Austrian Empire, formed a collection of the raw produce, and likewise of the manufactured articles, at that time used in Austria, and added to it by way of comparison, a great number of the productions of other countries. * * * At first his collection was confined to manufactured articles alone; he soon found, however, the necessity of extending it, and rendering it more instructive, by the addition of raw produce—thus forming a complete Trade Museum.

"The Great Exhibition has strongly shown the want of such a collection in England, and I feel that it is not foreign to the objects contemplated in these lectures, if, in conclusion, I should ask my brother members why should not we, even now, commence the formation of such a collection; why should not the Society of Arts undertake that which would be so great a public benefit?

"In throwing out this suggestion, I would remind you, not only that the Society of Arts possesses greater facilities than any other Society for collecting a great Trade Museum, but also that the many valuable and interesting specimens already in the drawers and cabinets of our model-room, constitute of themselves alone a collection of the very greatest practical importance."

The importance of a great Technical Museum was fully recognised by the Royal Commissioners, and was distinctly referred to by them in their Second Report, in which they not only pointed out the value of such an establishment, but even suggested that the Society of Arts might with propriety take part in its formation. They stated that "a Trade Collection, which in its nature must be fluctuating in illustration, the specimens not being permanent, would be advantageous in connection with permanent specimens of manufactures, and both might be usefully employed in the instruction of those who are to instil into industry that knowledge of science which is so important to keep it in advance of the intellectual competition among nations. Such Museums, of which the scattered elements already exist abundantly in the Metropolis, can only be of enlarged public utility when combined with instruction, the admirable effect of this combination being already seen in many other parts of Europe." (p. 31.)

And again,—

"The Trade Museum, so liberally presented by various exhibitors to the Commissioners, and the numerous promises of further contributions, added to the collection already possessed by the Society of Arts, and which, we have reason to hope, might be secured from its active co-operation, would form a nucleus of a very important character for a Museum of Manufactures worthy of this industrial country." (p. 31.)

The Report of the Royal Commissioners further points out the special want of a Museum of Animal Productions and Manufactures. Speaking of this, they remark:—

"This branch is less perfectly represented for the purposes of instruction than either the mineral or the vegetable kingdom. It is true that the Zoological Society, in their gardens, represent it efficiently, as far as regards living animals, but the products so much used in manufactures have not yet found adequate representation in any Museum."

On the 13th of April, 1853, the Council having taken the whole matter into their consideration, determined that the suggestions thus put forth should not be lost sight of, and, with a view to carry them out, proposed to me to undertake the formation of a Museum of the Raw and Manufactured Animal Products of all Countries, so as to supply the third element of a General Trade Museum—the two first, namely, the Mineral and Vegetable Kingdoms, being already, to some extent, represented—the first by the Geological Museum in Jermyn-street, and the latter by the Vegetable Museum at Kew.

As the undertaking was one of some magnitude, and involved considerable expense, and as it was, moreover, one in which the Royal Commissioners had some interest, the Council resolved to ask their aid and co-operation, and a letter containing the following proposal was, therefore, addressed to the Royal Commissioners:—

"The Council are of opinion that the Society of Arts can best aid in developing the views of the Royal Commission by commencing the formation of a Collection of Animal Produce and Manufactures, as being that element of a General Trade Museum at present virtually altogether unrepresented; at the same time, they consider that no opportunity should be neglected which might occur of collecting materials for the other branches of the Museum.

"The Council desire, in the first instance, to ask the approval and co-operation of the Royal Commissioners; and as they feel that, notwithstanding the great importance of the object, it would not be right for the Society to devote to it so large a portion of their funds as would be requisite, they would propose to set apart the sum of £100, to be expended in the course of the next two years, provided Her Majesty's Commissioners approve of the proposal, and are willing to devote a similar sum towards the proposed object."

This proposal met with the approval and sanction of her Majesty's Commissioners, as shown in the following paragraphs, extracted from their official reply, addressed to myself as Secretary, and dated May, 10, 1853:—

"Her Majesty's Commissioners direct me to acquaint you in reply, that they have received this communication from the Society of Arts with great interest and satisfaction, and that they fully approve of the course which the Society proposes to adopt, as shown in your letter; at the same time that it will afford them much pleasure to give every assistance in their power towards carrying out an object having so direct and important a

bearing upon the recommendations contained in their Surplus Report.

"With reference to the announcement made by you, that the Society has resolved to set apart the sum of £400, to be expended in the course of the next two years, towards the formation of such a Collection of Animal Produce and Manufactures, provided her Majesty's Commissioners are willing to devote a similar sum towards the proposed object,—I am to inform you that the Commissioners are prepared to assent to this proposal, and to contribute the above-mentioned sum of £400 in the manner suggested, to be similarly expended in the course of the next two years.

"Her Majesty's Commissioners trust that the exertions of the Society of Arts towards the formation, under your superintendence, of the Collection, will be attended with success; and that advantage may at the same time be taken, as mentioned in your letter, of any opportunities that may present themselves for the simultaneous collection of materials for the other branches of the proposed Trade Museum.

On taking charge of the important duty thus entrusted to my care, it became necessary that I should resign the office of Secretary to the Society, and accordingly I retired from the Secretaryship at the annual election, in July, 1853, and immediately commenced the task confided to me.

The idea of the Trade Museum was one which had occupied my attention for many years, the want of such an establishment having been practically shown to me in the years 1838-9, whilst engaged in an experimental examination of some of the little known productions of the East, under the direction of the Commercial Committee of the Royal Asiatic Society. I had, consequently, directed much consideration to the subject, and commenced the work, not only with much interest, but with a marked and definite plan of operations arranged.

Within the last three years a good deal has been said and written on Trade Museums generally, and on the nature and use of technical collections, for commercial and also for educational purposes. As I believe that very different ideas are entertained as to the true nature and aim of a Trade Museum, not only amongst the public at large, but even amongst the members of the Society of Arts, I think it will not be out of place if I state, as briefly as possible, my own views upon the subject, the main objects which I have kept in view, and the principles which I conceive most important to be carried out. These views I have already to some extent embodied in a letter to his Royal Highness the President, published last spring.

1. A Trade Museum should contain specimens of every variety of raw or manufactured produce from all parts of the world, no natural or manufactured article being excluded on the ground that it was of inferior quality, or altogether useless. They must be accompanied by illustrations, showing how they are prepared, and the purposes to which they are applicable. Specimens and illustrations should be shown of any animal yielding useful or ornamental products, and also of all those in any way hurtful to man, either directly, or indirectly by the injury which they cause to commercial or agricultural productions.

2. The Museum should contain machines, tools, models or drawings, showing the mode in which in the different raw materials are converted into manufactured articles.

3. The specimens must be accompanied by full and accurate information—scientific, commercial, geographical, statistical, and industrial.

4. The Museum should be progressive in its character—every new substance discussed, every new principle introduced, and every improvement adopted, being at once added to the collection in its proper place; but, at the same time, enough must be retained of the productions of former years to serve as evidence of the state of industry and skill of past times, and to mark the character of the advance which has been made.

5. As far as possible, everything should be done to render the specimens and illustrations instructive and suggestive. They should be so shown and placed as to need little explanation; their relations and the reason of their juxta-position should be self-evident. Each department of the Museum should be complete in itself, and should not only supply all those practical illustrations which a manufacturer would desire to see, or which a teacher might require, but should be so arranged that even a casual visitor would not fail to derive instruction from an examination of the specimens.

These remarks are, of course, equally applicable to each of the three kingdoms of nature, which in their technical, as in their philosophical relations, are so intimately connected that it becomes almost difficult to speak of one alone, without at the same time making more or less reference to the other two. I shall now, however, endeavour to confine my observations exclusively to the animal department, as that one with the illustration of which I am more specially charged. In accordance with the views just stated, it was necessary to collect specimens of all sorts and qualities of animal produce from all parts of the world. It was necessary carefully to study the whole animal kingdom, and collect illustrations of all those animals from every department of it yielding products, or possessing qualities, useful, hurtful, or ornamental; and these were to be accompanied by drawings, models, and other necessary specimens, as far as possible; and though, of course, I felt it was absolutely impossible in the short space of two years to form a complete technical animal museum, yet I did not despair that I should be able to bring together enough of a collection thoroughly to illustrate the mode in which such a museum might be formed, and the uses to which it could be put.

Many an isolated specimen, which, taken by itself, seems of little interest or importance, becomes one of considerable value, when from association with others, it constitutes a link of connection in an extended series. This is especially the case with those minute insects which prey upon commercial articles, deteriorating their value, or altogether destroying them. The insects themselves are small and insignificant in appearance, but their importance is at once seen and felt when illustrations of the effects they produce, and the rapidity with which they work, are shewn.

Of more obvious utility, and at the same time less troublesome to obtain, are illustrations of the ordinary arts and manufactures; but even these, to fulfil the objects for which such museums are designed, must be full and complete. As an example, I would mention the silk trade; it was desirable to obtain specimens of the various wild and cultivated silk worms and moths, with information on what they feed, and in the case of the cultivated varieties, drawings of the houses and implements used in rearing and tending them, shewing the different systems employed in different countries. Next, a complete collection of cocoons must be made, and drawings and other illustrations prepared, showing the various injuries to which the worms are subject, the mode in which they are killed, and the manner of packing and preparing the cocoons for distant transit. Again, the manner in which the worms form their cocoons, the microscopic structure of the silk, and the mode in which it is unwound, must be shown. These would include most of the specimens required for the illustration of the raw material itself. Under the head of manufactured silk it would be necessary to obtain drawings and specimens to illustrate the throwing, twisting, and spinning of the fibre, as practised in all parts of the world, the processes for removing the gum, the modes of dyeing, and all the various silken textile manufactures in which the fibre—either alone or in combination with other fibres—is woven into fabrics; and all this to be complete must be accompanied by a mass of technical and scientific information, only to be collected with much care and labour.

The first measure taken was that of making known the nature and objects of the collection in distant parts of the globe, and for this purpose circulars were drawn up and widely circulated. Some hundreds, accompanied by

written letters, were dispatched to foreign countries and British possessions abroad; and through the kindness of His Grace the Duke of Newcastle, copies of these circulars, together with copies of my letter to H.R.H. the President, already referred to, were sent to the Governors or Commanding Officers of all the British Colonies. Subsequently also, through the favour of the Committee for managing the affairs of Lloyds, the circular was transmitted to their agents all over the world, accompanied by a letter from the Secretary, drawing their attention to the important objects contemplated in the formation of this Museum, and expressing a hope that they might be able to aid. Very few communications in reply have yet been received from distant places, but the few that have arrived have expressed much interest in the Museum, and a hearty readiness to aid in all possible ways; in some instances accompanied by a handsome offer of services to act as general agents for the surrounding countries.

A special application was also made to the Court of Directors of the East India Company, who at once instructed Dr. Royle to prepare and forward to the Museum complete series of samples of all the animal produce then in their warehouses, and also promised to send from time to time such further specimens as it might be in their power to contribute.

In order that specimens transmitted from foreign countries might suffer as little injury as possible from hasty and careless examination at the Custom-house, whereby their value as Museum specimens would be much deteriorated, the Council, at my request, applied to the Lords of the Treasury on the subject, and their Lordships were graciously pleased to give instructions to the Commissioners of Customs to pass direct to the Society's House all packages intended for the Trade Museum, to be there opened in presence of an officer, and delivered free of duty.

Very few direct promises of contributions from abroad have yet been received, though a number of persons in various parts of the world have expressed much interest in the formation of the Museum, and willingness to aid should opportunities occur. These general promises of co-operation on the part of individuals, and still more in the case of Societies and commercial companies, are of considerable practical value, for as it would unquestionably form part of the duty of the officers of a future Trade Museum to convey information and specimens to distant places, and to facilitate the spread of technical information, as well as to receive and preserve them, so the mere commencement of systematic correspondence on trade subjects cannot fail to be of use, and will in time induce many to become contributors to the Museum itself. Especial mention should be made of the Smithsonian Institution of Washington, who have most liberally and handsomely offered to undertake the general agency of the United States, distributing circulars and notices, receiving from contributors throughout the States such articles as they may be disposed to send, and transmitting them from time to time to London. Similar promises of co-operation have also been made from the Bombay Presidency by the Chamber of Commerce of Bombay; from the Madras Presidency, by Dr. Hunter, as President of the School of Arts; and by the Vereeniging voor Volksvlijt of Amsterdam for the kingdom of the Netherlands. Many promises of similar local assistance have been received from individuals at St. Petersburg, Berlin, Madeira, Paris, Lyons, Nice, Port Mahon, Montreal, Kingston, the Baltic Ports, Calcutta, New South Wales, Charente, Philadelphia, Iquiqui, and other places; and in many of these it is hoped shortly to establish a direct correspondence with technical Societies, though obviously correspondence of this sort goes on but slowly, and takes considerable time to organise and arrange.

With many persons an idea exists that only specimens of superior excellence are suitable for a Museum, and, therefore, those both able and willing to contribute, do not do so because, as they say, better specimens will doubtless be sent from other places. It would perhaps be hardly necessary to advert to the consequences of this mistake were it not for the heavy correspondence which is necessary to correct it. A Trade Museum should present a true and faithful picture of the commercial resources and industrial progress of each country; and besides, in many cases, the inferior quality of certain productions arises from faulty modes of preparation, and a careful comparison with similar productions of other countries might lead to their improvement by indicating the true cause of their inferiority.

In the meantime, and whilst these provisions for the future progress of the collection were being made, circulars were also widely distributed amongst home producers and manufacturers, and many promises of aid were obtained. The question of scientific arrangement had to be considered, and in doing this the advice and assistance of many of the leading members of the London Societies for promoting natural knowledge were sought and freely given. It was also necessary to prepare full and complete lists of all animal substances employed in the arts and manufactures, and in this task, which at the present time though forward is not quite completed, important assistance has been rendered by the members of the Standing Committees of the Society, and also by many eminent manufacturers not at present connected with it.

As amongst animal productions Wool stands in peculiar pre-eminence from the very important position it occupies amongst our national manufactures, it was thought desirable to devote much care, even at the very commencement, to the formation of a full and complete collection of raw wools of every description. One of the first measures, therefore, was that of applying to all the leading sheep breeders of the United Kingdom, and in doing this the aid of the great Agricultural Societies of the empire was asked and liberally given. Lists of all the chief sheep breeders of England were given by the Royal Agricultural Society of England, those of Scotland by the Highland and Agricultural Society, and those of Ireland by the Royal Society of Dublin. These lists, together with many smaller ones kindly supplied by local agriculturists, enabled a tolerably complete list of sheep breeders to be applied to and requested to present fleeces or samples of wool. In reply to this circular many promises have been received, and the fleeces are beginning to arrive, as the shearing of the different counties is completed. The circular was accompanied by schedules of questions, prepared with the aid of the President and several members of the Council of the Royal Agricultural Society of England; so that every fleece presented is accompanied by full and accurate information as to the variety of the sheep and the circumstances under which it has been reared.

Promises of co-operation have also been made by various other Societies, especially the Royal Scottish Society of Arts, the Zoological Society, and the Entomological Society of London, and the Polytechnic Society of Yorkshire. A circular respecting the formation of the collection having been issued to a number of local Institutions, replies expressing interest in the Museum have been received from many towns, amongst which may be mentioned the following:—

Ashton, Beverley, Bramley, Buckingham, Castle Howard, Clapham, Coggeshall, Crieff, Croydon, Darlington, Derby, Dewsbury, Farnham, Halifax, Holmfirth, Hull, Lancaster, Leeds, Macclesfield, Maidenhead, Malton, Newark, Northampton, Ossett, Portsmouth, Shelton, Scarborough, Slough, Southampton, Stourbridge, Thirsk, Wakefield, Wenlock, Wentford, Winchester, Windsor, Wiveliscombe, York.

At the recent meeting of the Yorkshire Union of Mechanics' and Literary Institutions, the subject was prominently brought forward, and is recommended in the report to the members of the Yorkshire Institution as a

national undertaking well worthy of their aid and co-operation.

Amongst merchants and manufacturers, as might be expected, the Museum at first, for the most part, did not meet with much approbation and encouragement, and promises of contributions have come in but slowly, and been obtained with difficulty. Fortunately, those who have consented to present series of specimens include many of the most eminent and intelligent of our manufacturers, and will of themselves constitute a very valuable series of illustrations of many of the chief arts in which animal raw materials are employed. Amongst these, 25 firms have promised illustrations of the various branches of the woollen manufactures; 9 those of silk; 6 oils, wax, and spermaceti; 6 leather, hides, furs, and skins; 4 pharmaceutical products; and 13 miscellaneous manufactures. At present, having had no accommodation for the recepiton and arrangement of specimens, no attempt has been made to bring together those promised, and the total number named does not exceed 400. The Council having now determined to devote the Society's model-room for the next five months to the formation of the collection, the various series of specimens promised, together with those already received, and those previously existing in the Society's repository, will, in the course of the summer, be brought together, and to some extent arranged, in order that steps may be taken to supply the more important deficiencies; this measure will greatly facilitate the formation of the collection, as nothing is more likely to induce manufacturers to contribute than showing them the progress made, and the articles presented by their friends or rivals.

As I have already said, I do not expect at the end of the two years to have brought together a full and complete Animal Museum—this is, necessarily the work of many years—but I feel confident that I shall have collected such a series of illustrations of the animal manufactures and productions as will be of high practical value, and creditable to the Society of Arts.

(Signed) EDWARD SOLLY.

PHOTOGRAPHY.

Wax Paper Process.

At the last meeting of the Photographic Society a paper was read by Mr. Townsend, giving the results of a series of experiments instituted by him in reference to the wax-paper process. One of the great objections hitherto made to this process has been its slowness, as compared with the original Calotype process, and its various modifications; and another that its preparation involved some complexity of manipulation. Mr. Townsend has simplified the process materially, having found that the use of the fluoride and cyanide of potassium, as directed by Le Gray, in no way adds to the efficiency of the process, either in accelerating or otherwise. The iodide and bromide of potassium with free iodine give a paper which produces rapid, sure, and clean results. He discards whey, sugar of milk, grape, sugar, &c., hitherto deemed essential, but which his experience shows to be unnecessary. He exhibited three negatives of the same view taken consecutively at eight o'clock in the morning, with the respective exposures of 30 seconds, 2½ minutes, and 10 minutes, each of which was good and perfect. The formula he adopts is:—

Iodide of Potassium	600 grs.
Bromide of Potassium, from 150 to	250 ,,
Re-sublimed Iodine	6 ,,
Distilled Water	40 oz.

The waxed papers are wholly immersed in this solution, and left to soak at least two hours, and are then hung to dry in the usual way. The papers are made sensitive by wholly immersing them in aceto-nitrate of silver of the following proportions:—

Nitrate of Silver . . .	30 grs.
Acetic Acid	30 minims.
Distilled Water	1 oz.

the papers remaining in this solution not less than eight minutes. They are washed in two waters for eight minutes each, and then blotted off in the ordinary manner. Mr. Townsend states that there is no need to fear leaving the paper in the sensitive bath too long. He has left it in the bath 14 hours without any injury. The paper thus prepared will keep ten or twelve days; it may be longer, but his experience does not extend beyond that time. With paper thus prepared a portrait was exhibited, taken in 55 seconds, in a room with a side light, but it must be added that in this instance the paper was not washed, but was blotted off immediately on its leaving the sensitive bath, though not used until two hours had elapsed. Mr. Townsend uses for developing a saturated solution of gallic acid with a dram of aceto-nitrate to every four ounces of it, but he considers that this proportion of aceto-nitrate may be beneficially lessened. He finds that by this process he is certain of success, and is never troubled with that browning over of the paper which so often attends the use of the other methods of preparation. Besides the rapidity of action which he states, there is the further advantage that a lengthened exposure is not injurious. The proportion of bromide may vary from 150 grs. to 250 grs.; less than 150 is not sufficient to produce a maximum of rapidity, whilst more than 250 adds nothing to the effect.

INSTITUTE BOOK ORDERS.

May Account.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Aberdeen, Mechanics' Institution	3	0	0	2	6	11
Bromsgrove, Literary & Scientific Institution	11	9	6	8	16	8
Bury, (Lancashire) Athenæum .	4	11	6	3	11	2
East Retford, Literary & Scientific Institution	0	17	4	0	14	4
Gateshead, Mechanics' Institute .	2	14	6	2	4	11
,, Washington Chemical Works, Library and Reading Room	7	13	10	5	18	0
Launceston, Mechanics' Institute	2	18	0	2	1	0
Leamington, Literary and Scientific Institution	1	6	6	1	3	1
London, Bank of England Library and Literary Association . .	16	5	0	12	9	9
Newport, (Salop) Mechanics' Institution and Literary Society .	2	10	0	2	4	8
Peterborough, Mechanics' Institution	5	5	0	3	10	10
St. Ives, Institution	1	15	6	1	3	1
Sevenoaks, Literary and Scientific Institution	2	8	6	1	17	3
Sheerness, Isle of Sheppy Mechanics' Institution . .	0	14	6	0	11	5
Shrewsbury, Literary & Scientific Institution	10	0	6	7	15	6
Stamford, Institution	3	8	7	2	13	2
Tamworth, Library and Reading Room	8	4	8	6	4	11
Tunbridge Wells, Useful Knowledge Institution	7	1	0	5	4	4
Windsor and Eton, Literary, Scientific, and Mechanics' Institution	2	19	0	2	6	6
Worksop, Reading Society and Mechanics' Institution . .	7	2	6	5	7	6
	£102	5	11	£78	3	0

Being a saving of £24 2s. 11d., or an average discount of about 25 per cent.

RATING OF INSTITUTES.

The Chichester Literary Society and Mechanics' Institute was recently summoned before the City Bench of Magistrates, at the instance of the Board of Guardians, for not having paid a sum of £1 16s. 2d., alleged to be due in respect of a poors' rate made in March last.

The poor rate collector produced the rate-book of the parish, and stated that the rate in respect of which the defendants were summoned was made on the 6th of March last, that it had been demanded, and was still unpaid.

On the part of the Institute the certificate of Mr. John Tidd Pratt, under the statute 6th and 7th Victoria, c. 36, exempting scientific societies from parochial rates, was produced. It was submitted that the parish officers in the present case had taken a wrong step in order to enforce payment of the rate with which they had charged the defendants, because, by the 6th section of the act of parliament, power was given of appeal to the quarter sessions against the barrister's certificate, and all persons appealing against such a certificate were bound to give a notice extending over a certain number of days, and to enter into a recognizance to pay all costs. The provisions of the act had not been complied with in this case; and it was urged that the certificate of Mr. Pratt was binding, and exempted the society from the payment of rates until it was appealed against and upset, and that the mere production of the certificate was sufficient to show that the case could not be supported against the defendants.

It appeared in evidence that, since the granting of the certificate, nine or ten rates had been made and collected in the parish, but no claim till the present had been made on the Institute. The *Queen* v. *Pocock*, the *Queen* v. *Jones*, and the *Queen* v. *Manchester*, were referred to as showing that the barrister's certificate could only be upset on appeal to Quarter Sessions, and that the Petty Sessions had no power over it.

On the part of the guardians it was contended that the rate, having been made, and duly signed, and published, was good until appealed against. The *Queen* v. *the Justices of Cambridge*, the *Queen* v. *Milton*, 3. *Barnwell and Adolphus*, were referred to.

In the case of the *Queen* v. the *Birmingham New Library*, 18th *Law Journal Reports*, the Court of Queen's Bench held that the non-payment of the rate for five years' was a matter of no consequence, and that the whole five years' rates, not having been appealed against, must be paid, although, at the same time, the court decided that the Library was entitled to exemption. The *Queen* v. *Phillips* was cited as showing that the certificate was not conclusive proof of the right against the overseers; for, although good at the time it was granted, it might be rendered void by the society not continuing to keep with the terms of the statute.

The court, after consulting about half an hour, said, that they had nothing to do with the question of whether the certificate of Mr. Tidd Pratt exonerated the society from payment. That appeared to be a matter for decision elsewhere. It having been proved that the rate had been duly made, allowed, and published, the magistrates felt they were only there to enforce, or rather to assist in enforcing the payment of the rate. Of course, if another rate was made, the society could appeal against it at the proper time, and they could bring forward the certificate of Mr. Tidd Pratt.

Colonial Correspondence.

THE RESOURCES OF BRITISH GUIANA.

Guiana Public Buildings,
Demerara, 10th May, 1854.

Sir,—Adverting to former communications from the Society of Arts upon the subject of the better development of the resources of this colony, I have the honour to acquaint you, for the information of the Society, that the legislature having been pleased to place at the disposal of the Royal Agricultural and Commercial Society the sum of £500 stg., to be expended in the furtherance of that object, a General Committee was appointed at a public meeting of parties interested, and an Executive Committee and various Sub-Committees have been since organized, to whom have been entrusted the devising and carrying out the requisite arrangements.

The nature of these will be probably best understood from a reference to the accompanying scheme or prospectus, which, although in some respects incomplete, I have the honour to request you will be good enough to bring to the notice of the Society, in the hope that we may be encouraged and guided by the expression of their opinion upon the task we have undertaken, and the means by which we propose to accomplish it.

I have the honour to be, Sir,
Your most obedient and faithful servant,
W. WALKER,
Government Secretary, and Chairman
of the Executive Committee.

The gentlemen composing the Executive Committee are the Hon. W. Walker, Chairman; J. Trounsell Gilbert, Esq.; Rev. E. A. Wallbridge; J. S. Stutchbury, Esq.; Fred. Winter, Esq., Treasurer Museum and Exhibition Fund; J. Noble Harvey, Esq.; W. H. Holmes, Esq.; H. Watson, Esq., Act. Sec. Royal Agricultural Society.

The objects which the Executive Committee have in view are principally three, namely:—

1. The obtaining of a suitable collection of illustrative Specimens of the natural and manufactured Products of the colony, to be forwarded to the Exhibition of the Industry of all Nations, proposed to be held at Paris, in 1855; the ultimate disposal of such collection being matter for subsequent determination.
2. The obtaining of a similar collection for a local Museum, or, in other words, that the various specimens obtained for the first mentioned object being in duplicate, one series shall be deposited in some suitable locality in George-town, to constitute the nucleus of a Colonial Museum; and,
3. To connect with this last named project an exhibition of samples of the results of local industry, in the shape of improved specimens of articles or of animal and vegetable productions in ordinary use, or of specimens of other products not yet in use, but which may be made available for consumption.

With regard to the 1st and 2nd of the objects thus defined the Executive Committee beg leave to refer all parties interested to the first section of the subjoined schedule, with the intimation that they will be prepared to repay to individuals who may be kindly disposed to exert themselves in furtherance of the objects thus specified, any reasonable amount of *actual outlay* unavoidably incurred, upon the single condition that the amount likely to be required in each case shall be first submitted to the Executive Committee and be by them approved; and the Executive Committee trust that the liberal spirit which has hitherto, on similar occasions, manifested itself in the gratuitous exertions of so many respectable and influential inhabitants will not be wanting now, in furtherance of objects more diversified, and, they will venture to add, more important than any previously contemplated.

With respect to the third, and more novel portion of the scheme, it may be desirable for the Executive Committee to enter somewhat more fully into detail.

The Executive Committee are impressed with the belief that there will not be wanting suitable responses to an invitation to the artisans, small freeholders, and farmers, and even to the labourers of the colony, to produce at a Public Exhibition samples of the result of extra care and diligence bestowed upon the raising of stock, the cultivation of fruits, vegetables, and flowers, and the practice of the mechanical arts. In order to afford every reasonable encouragement

to those classes to do this, the Executive Committee propose that suitable Premiums, either in money or in medals, shall be awarded to the producers of the best articles, while all shall (as far as the Committee's means will allow) be remunerated for the diligence and intelligence they may have displayed, even if unsuccessful as competitors for the principal prizes.

It is obvious, that as what can be done well once can be always as well done if proper energy be manifested, there will be a local demand created for the improved specimens of the results of labour and skill applied in the branches to which allusion has been made. But more than this, the Executive Committee, being in correspondence with the Society of Arts in London, propose to give such successful competitors as may bring forward articles capable of being preserved sufficiently long, the additional advantage of transmitting their specimens to London, thus opening up a prospect of a wider field and more extensive market, while contributing to augment the variety of exportable products of this colony.

It is proposed that all articles received, in every class, shall be exhibited publicly at a time to be hereafter announced, but which will probably be fixed some time in the months of November or December next certainly not earlier.

The Executive Committee desire it to be distinctly understood, that while they have especially in view the object of affording a wholesome stimulus to the industry and skill of the humbler classes of society, and while they indicate certain kinds of objects as being of more peculiar and general interest, individuals of all classes will be alike welcomed to the proposed competition, nor will any article be excluded from the benefits of the scheme they have undertaken to carry out.

They have but one aim: it is to promote the wise and enlightened intentions of the Legislature by augmenting the general mass of wealth, in encouraging the humblest classes to come forward and show what can be done by mutual co-operation for a common object, unimportant, and even trifling, as some of the efforts may appear to be if regarded individually. The Executive Committee are convinced that the object can be attained; but while no effort of theirs shall be wanting to achieve it, the issue rests not with them alone; they must be supported by the good feeling, intelligence, and, they will add, patriotism, of the classes whose benefit they more especially seek, for success, though with such support, certain, will as certainly without it not be secured. * * * *

The lowest price of every article of which the proprietor may be desirous or willing to dispose, to be marked in legible figures thereon, and also to be distinctly specified in the accompanying list or description, as a guide to the Committee in carrying out their arrangements, as well as to the public who may have an opportunity of inspecting them.

The Executive Committee will undertake to facilitate as much as possible the sale of such articles, whether they obtain prizes or not, but adverting to the importance of making immediate pecuniary profit secondary to the awakening a wider interest in the articles themselves, they suggest that in all cases the lowest remunerating prices should be invariably stated.

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SECTION I.

Articles desirable for transmission to the Exhibition at Paris, and to be deposited in the Colonial Museum.

SACCHARINE PRODUCTIONS.

Sugar—Vacuum Pan, specimens of the results of every process in use.

Sugar—Cane, from various localities and of various stages of growth.

Rum—Coloured and uncoloured, of various strengths.

Shrub—various qualities.

FIBROUS SUBSTANCES.

Plantain, Ochro, Agave or Oloe, Ita Palm, Marita Palm, Cotton, Mahoe, Silk Cotton, &c.

Home Correspondence.

EDUCATIONAL EXHIBITION.

SIR,—In the praiseworthy endeavours of the Society to get together for their approaching exhibition every variety of materials, in the form of books and other productions, it is to be hoped that the other question, of the best mode of developing individual faculties, will not be forgotten. The object of education is to produce the best general results to the whole community in increased production and individual happiness. This can best be brought about by giving full scope to the individual faculties, and in no way overlaying them by what is called system—*i. e.*, by making every pupil pass through the same routine of study. Mere routine acquirement does not produce results in the shape of further production. Acquirement or acquisition does not necessarily imply the utilising of acquirement, any more than the possession of a chest of tools will constitute a carpenter. Every human being is born with one or more especial tastes and aptitudes, and, in proportion as he or she obtains the means of cultivating and developing those tastes and aptitudes, the more happy will they individually become and the more useful to their fellows. We cannot *teach*—*i. e.*, we cannot make minds absorbents of useful knowledge, unless they have the aptitude for the peculiar knowledge sought to be taught; and where the apt minds and matter exist in proximity the process of teaching is little needed. They unite as acids do with alkalies. The minds become instructed by the mere act of beholding. What are called self-taught people merely go through this process, all people who learn being in reality self-taught, though others may help them go through their lessons. The self-teaching is regarded as an extraordinary thing only because peculiar aptitude has existed for acquirement, and the individual has acquired something very much out of the track of the occupations he has been born amongst. Thus the rhymes of a shoemaker were regarded as productions of genius, and probably would have been disregarded if produced by a university-bred man.

To spread the means of knowledge is the great end to be had in view, so that every man, woman, and child may have their aptitudes awakened. All the peasant-born are not necessarily born with the aptitudes of earth cultivators. All those born of factory-workers are not born with factory aptitudes. Many are born with constitutions not adapted to the climate they are born in, and need instruction how they may best get away and settle in such a climate as they are born to enjoy.

The common process of education has been arranged in certain classes, according to rank and position in life, without regard to natural faculties. The peasant labourer's boy-child is set to scare birds, or to weed, or to tend sheep, till old enough to handle a spade or fork, or stand between the stilts of a plough. The girl-child varies scarecrowing, weeding, and sheep-tending, with waiting on cows and in-door drudgery. All knowledge of books and arts, reading, writing, or other things connected with these, and for which nature may have endowed them, is a matter of mere chance, or rather of considerable probability that they will not acquire. The next grade, the working-farmers and foremen, get the true knowledge how to read and write and cast accounts, and stay at school till ten or twelve. Then follow the trading-classes, whose children stop at school till fourteen years of age, and pass the following seven years in learning a business. Then come the young men of the Universities, who go on till past manhood in going round the circle of University education, in order to pass into what are called the liberal professions, whose parents are mostly "well to do" in the world. But none of these fulfil the condition they ought to fulfil, of offering to all the means of determining the sphere to which it has

pleased God to call them, and which, in most cases, it pleases man to thwart.

In a general scheme of education we need that the whole circle of learning, the whole circle of the arts, the whole circle of handicrafts and of machine processes, should be open to children and to men and women. It is not enough to have a Great Exhibition; we need a constant exhibition, to which learners may run in and out at their will. There is scarcely any place in which the public school might not be made instructive to children in all the arts of life—in which, by the age of fourteen, they might not be as competent to the production and preparation of good clothing and lodging as men now usually are at twenty-five, and all that, combined with a greater amount of such knowledge than is usually attainable at present.

The production and preparation of food is the first consideration, involving gardening, the care of animals, chemistry of a common kind, and cooking, baking, and preserving food. Many of these processes could be observed and acquired by being simply shown how to observe, and in which useful observation will infallibly go with the aptitudes, resulting in invention and progress.

The next question is of clothing, all the processes of which might be exhibited, both of machines and handicraft, and this would tend gradually to the extinction of drudgery, and to improved classes and qualities of clothing.

After that would come the building arts, and then the arts of elegance, and of all those pursuits that lift man out of mere sense.

It seems to me that there needs a new cycle of the things that man should know, placed tangibly before him. The last century has outgrown the Universities and their mental abstractions. It would be a worthy task for the Society of Arts to set forth a new syllabus, embracing all the useful processes of life, so as to give facilities for the absorption of knowledge, putting fourteen years of age into a state of progress as advanced as the present average of thirty. I purpose to return to this subject.

I am, &c., yours,

COSMOS.

MECHANICS' INSTITUTE CLASSES AND EXAMINATIONS.

SIR,—I should feel obliged by your giving insertion to the following remarks in explanation of a letter which appeared in the *Journal* of last week, on Mechanics' Institute Classes. I think no one will deny the importance of special instruction in those sciences which can be practically and usefully applied in our industrial economy. Take the case of a boy who leaves school at 13 years of age; he is apprenticed to a carpenter or builder for seven years; he has no disposition to join a Mechanics' Institute, because his previous education has in no way prepared him for the advantages likely to result from such an association. During his apprenticeship he has had some experience in framing roofs, floors, partitions, and girders. Pieces are framed as struts and braces at particular angles; plates are squared at the ratio of 6, 8, and 10. All this is done, and a hundred other things without any theoretical knowledge of the principles upon which these results depend,—he cannot even measure his work. Such a man may be a good mechanic, and have great natural abilities, but he must always be a carpenter.

I once knew a journeyman wheelwright who had great powers of invention. His ingenuity made him very popular in the village. During the period of our acquaintance his spare time was devoted, with great earnestness, to the following inventions: a mill for poor people to grind and dress their own floor; a machine to wash and dry clothes; a manu-motive machine; a self-acting orrery, which I think is now in one of the colleges at Oxford; and lastly, perpetual motion,—the thing which most men try when everything else fails. Now this man had powers of invention which might have enabled him to take his stand among the great inventors of modern times, but he wanted a knowledge of those scientific principles upon which the correctness of his inventions depended.

I know there is a very popular opinion among working men that great discoveries and inventions are generally the result of accident. The history of inventions proves this to be a great mistake. Last week, a plumber came to a house where I was staying, to repair a pump. The following dialogue took place:—

"Were you not fitting up a pump last week at Mr. —?"

"Yes, sir; but it did'nt act."

"Why not?"

"Because, sir, if you know the house, you have to go over a hill before you get to it; now the suction on a hill is not so great as it is down here."

"I don't exactly understand what you mean by suction."

"Why, sir, if you take a straw, and put one end of it in water, and suck at the other, you will draw the water into your mouth. Now, it requires a certain force to suck it up, and the suctional power of a common lift-pump was not sufficient, so they are obliged to raise the water with a windlass and pail."

Now, here was an instance of a man who had probably fitted up some hundreds of pumps—had followed the business of a plumber for thirty years—worked for all the gentry in the neighbourhood, as ignorant of the principle of a common pump as men were three hundred years ago. A few weeks ago, an accident happened at one of the Chemical Works in this place; a strong smell of hydrogen indicated a leakage in one of the retorts. A workmen clambered to the top of the retort, with a lighted candle, to discover the fracture. The consequence (as almost any one might have anticipated) was an explosion, which seriously injured three of the workmen, besides doing great damage to the apparatus. A few years ago I was in the mining districts, and, accidentally meeting a miner, who was going to work, we entered into conversation. I made some remark on his lamp, which was an improved Davy, to which he at first replied by wishing to drink my health; as we grew more friendly, he said,—"Ah! them lamps ain't much good; yer just as safe with a candle." "Do you ever unscrew it when you are at work." "Oh! yes we do, its just as safe as not; they say it prevents yer from been blowed up; but if a man is to be blowed up, he will be all the same for that." I mention these facts to show that a special knowledge of some subjects is very desirable. Unhealthy occupations might be made more healthy, human labour might be economised, and much valuable life and property saved, by a more general diffusion of scientific knowledge. The English people are a practical people, but, unless our mechanics and artisans are instructed in the theory of the particular industries, as well as the practice, we shall, in a few years, experience difficulties which it may then be too late to remedy. The time for a monopoly in education is gone. I have always been anxious that useful knowledge should be within the reach of all. I have no wish to exclude clerks, shopmen, warehousemen, or any class of men, from the acquisition of knowledge: but I think it will be generally admitted that clerks, shopmen, &c. so far as regards reading, writing, and arithmetic, are considerably in advance of mechanics and artizans. I do not think there would be any difficulty in arranging a course of instruction to meet the requirements of every class.

I cannot allow my political economy to be ignored without saying a little in its behalf. I regard this subject as one of great importance. I know the word political has a great terror to some people; perhaps we can substitute another word. Anything which is likely to be a safeguard against erroneous principles, a boy should be taught to know and understand when at school. There is no science of political economy for different classes, any

more than there is an astronomy for different stars. In times of distress working men become politicians; they seek relief by means which are often totally incompatible with their own interests. Trades' unions, strikes, and lock-outs frequently exhibit a marvellous amount of ignorance of those laws by which the price of labour is regulated. This ignorance is not confined to the working classes; how frequently, during the past few years, have we heard such sentences as these: "The price of food regulates the price of labour." "Machinery injures the working man." "Men ought to fix a price on their own labour." It is impossible to estimate the consequences of such ignorance amongst the masses. All the political economy I want is just sufficient to protect men against the clap-trap of unprincipled agitators; and this, I think, can be found in a little work just edited by the Dean of Hereford. But I would not obstinately insist upon my political economy crotchet if it would in the least degree retard any useful measure of education for the working classes. The course of instruction extending over a period of three years, and the subjects proposed, are not exactly what I could have wished; but I would not make this an objection to any earnest and well-directed effort for the elevation of the working classes.

Perhaps trade schools might in some places be very beneficially connected with institutions. In our elementary schools boys do not get that education which at all adapts them to the routine of a Mechanics' Institution.

I hope in time there will be some stronger bond of union between the classes in an Elementary School and the more advanced classes of a Mechanics' Institution. The Institutions in Union might contribute some useful information on this subject.

Your obedient servant,

June 12. J. C. BUCKMASTER.

Proceedings of Institutions.

ANNAN.—The sixth annual report of the Mechanics' Institute states that there has been a total increase upon the year of 43 members, the average in the four quarters amounting to 225. The library has been increased from 934 to 1,140, being an addition of 206 volumes; about two-thirds of these were purchased with the funds of the Institute. The number of volumes exchanged was 5,500, being an increase of 805 volumes over the preceding year, and the average number of readers per quarter has increased from 173 to 190. It is considered that the arrangements made by the Society of Arts with the principal publishers to supply books and maps at reduced rates, will confer a very important benefit on the Institute, and advantage has already been taken of the plan. The news-room, which has now been opened twenty-seven months, continues to be well frequented. It is supplied with thirty-five papers weekly. During the winter a course of thirteen lectures was delivered on various topics—literary, social, and scientific. The Rev. J. Gailey offered a prize of one pound for the best report, furnished by any member of the Institute, of this course of lectures, provided there were at least four competitors. It is a matter of regret that no reports were handed in in competition. Mr. Sewell offered the six-shilling case of mathematical instruments for the best report of the lectures furnished by any *apprentice* member, and Mr. Waugh offered, as a second prize, the half-crown case. The first prize was awarded to John Murphy, and the second to John Sewell; the former a pupil teacher, and the latter a pupil in the Annan Parochial School. A sum of five pounds was set apart, in August last, as the nucleus of a fund for building a Mechanics' Institute Hall, and the committee recommend that a further similar sum be now set apart for the same purpose. The receipts amounted to £122 10s., of which £22 1s. 7d. had been invested.

LYNN.—The inauguration of the Athenæum will take place in the month of August, previous to the occupation of the building by the Associated Institutions. All the civic authorities, the members for the borough, the ministers of religion, the schoolmasters, with six of their most meritorious pupils, are to be invited to meet the presidents and vice-presidents and other officers of the Associated Institutions—viz., the Museum, the Subscription Library, the Conversazione and Society of Arts, the Musical Union, the News Room, and the Stanley Library. The formal act of inauguration will be followed by addresses, admission to which meeting will be by tickets at 2s. 6d. each. In the evening there will be a *soiree*. It is proposed on the second day to open three distinct exhibitions—Museum, Fine Arts, and Trade. A special interest attaches to the Trade Exhibition, because, as was recently suggested by the President of the Conversazione, (Mr. H. Edwards,) if the undertaking prove commercially successful, it may easily be made an annual feature of the mart, and may thus be the means of diverting into the pockets of the local tradesmen some of the money now squandered on the trash of itinerant bazaars. An evening concert will be held in the Music Hall on this day, when it is proposed to perform Handel's Messiah on a scale of grandeur unprecedented in Lynn. On this occasion the chorus of the Musical Union will be assisted by several members of the Norwich Choral Society; the local instrumental force will be increased from the Norwich Philharmonic Band, and from other sources, and the solos will be alloted to eminent professional artistes.

STALYBRIDGE. — On Tuesday evening, the 30th of May, Samuel Giles, Esq., Member of the Literary and Philosophical Society of Manchester, delivered a lecture, in the Town Hall, to the members and friends of the Mechanics' Institution, "On the life, character, and discoveries of the late eminent philosopher, John Dalton, D.C.L., F.R.S., &c., &c." The principal laws connected with the atomic theory, discovered by that gifted man, were familiarly explained, and the lecturer commented on the untiring zeal and energy which Dalton displayed in the pursuit of knowledge throughout the whole of his life. At the close of the lecture a vote of thanks to Mr. Giles, for his gratuitous services, was proposed by R. Hopwood, Esq., seconded by the Rev. T. B. Floyd, M.A., and carried unanimously.

YORKSHIRE UNION OF MECHANICS' INSTITUTES.—The seventeenth anniversary of this association of Educational Institutes was celebrated in Bradford on Wednesday week, —the morning conference being held in the theatre of the Mechanics' Institute, Leeds-road; and the soirée in the evening, at St. George's Hall. Edward Baines, Esq., the president of the Yorkshire Union, presided at the conference in the morning, which was attended by an unusually numerous assemblage of delegates and friends. The report commenced by adverting to the resignation of Mr. T. J. Pearsall, as agent and lecturer to the Union, whose "zeal, varied knowledge, and indefatigable industry," in discharging the duties of his office, were suitably acknowledged. Since the first of April the duties of agent to the Union have been fulfilled by Mr. G. S. Phillips, late secretary of the Huddersfield Mechanics' Institute. It then goes on to remark that the Union finances are far from being in a satisfactory position, as, to carry on the agency and the general operations of the Union with effectiveness, the subscriptions, independently of those derived from the Institutes (which are also in arrear), should be 300*l.* per annum; whereas they do not amount to more than 150*l.* Nearly every Union of Institutes hitherto established has ceased to exist for want of support, but the Committee would not willingly believe that the Yorkshire Union will be added to the list. With regard to the Itinerating Village Library, the committee trusted, if properly supported, to show the present practicability of every village having its library, and perhaps even its reading room. The fact that there are now in connexion with the Union (inclusive of the

Castle Howard district) thirty villages, circulating about thirty-five sections of 50 volumes—together, 1,750 volumes, which would shortly be much increased, showed that the difficulties in the way are not insuperable. The great impediment to the present further extension of the plan was want of funds; and although the committee proposed to augment the sum to 250*l.* (of which 160*l.* was already obtained), the whole 250*l.* would be required to defray the expense of the scheme at its present extent. The aggregate position of the Institutes of the Union, so far as was ascertainable from the returns sent in, was stated in the report to be as follows:—

Total number of Institutes in the Union.........	128
Number of Members in 96—males 15,730; ...... females 1,575.........................	17,305
Income in 85 Institutes......................	£9,947
Number of volumes in libraries of 98 do.	94,637
Circulation of volumes in libraries of 93 do	309,390
Books added during the year in 83 do	6,367
Periodicals in 87 do.—daily, 18; weekly, 444; monthly, 547; quarterly, 77	1,086
Lectures in 80 do.—Scientific, 233; literary, 525; musical, 30	788

The average amount of income per head in 75 Institutes, comprising 15,251 members, was £9,201, or 12s. 0¼d. per head per annum. Of the 788 lectures delivered, 143 were paid for, and 645 gratuitously delivered. Although some Institutes had withdrawn during the year—having ceased to exist—the total number of Institutes still in the Union is 128, or one more than last year. Yorkshire occupies a proud position in the number of its educational Institutes; for whilst it contains but a twelfth of the population of the United Kingdom, it possesses more than a sixth of the Institutes, and nearly a sixth of the total number of members. The Penny Savings Bank still prospered in several places; but at Huddersfield it had been relinquished in consequence of occupying too much of the time of the promoters of the Mechanics' Institute; and the report suggested the establishment of some independent organization for receiving weekly the small contributions of the young. The report concluded as follows:—"Mechanics' Institutions must gradually assume a more strictly educational character, and endeavour to fulfil the important objects contemplated at their origin. *Then* it was permature to aim at systematic instruction; but *now*, if these Institutions will keep their rank among social agencies, they must lay hold of the prepared portion of the people and carry them forward to a higher point of culture. They must throw their force into classes for practical and scientific instruction—become, in fact, the people's college. This does not involve the giving up of such valuable features as the miscellaneous lectures and library, the news-room, the social meetings, and the like, which Mechanics' Institutions have done so much to popularise. These things should be so diffused in our large towns, as to become a part of the daily social life of the nation. And they might be, if a freer intercourse of classes could be generally established; if the magistrate, the clergyman, the Dissenting minister, and the wealthy citizen would from time to time mingle with those beneath them in rank—not as mere patrons, but as friends and instructors also; if they would teach the working men and women how to make the most of their resources, and show that sympathy with their welfare which, as the late Mr. Justice Talfourd expressed in his last words, tend more than any book education to the culture of the affections of the heart and the refinement of the character of those to whom it is extended." Mr. Kitson, the treasurer, read the cash account, from which it appeared that the receipts during the year, including a balance in the treasurer's hands of £9 1s. 6d., had been £261 13s. 6d., against an expenditure of £278 19s. 4d., leaving a balance due to the treasurer of £17 5s. 10d. The dinner took place in the saloon of St. George's-hall, at half-past four o'clock, under the presidency of John Rawson, Esq., clerk to the justices, and the vice-presidency of Mr. Ald. Rogers. Upwards of 150 noblemen and gentlemen sat down. The soiree, or public meeting was held in St. George's-hall, at half-past six o'clock. Upon the platform were the Right Hon. Lord Beaumont, in the chair; Viscount Goderich, the Hon. and Very Rev. the Dean of Ripon, J. D. Dent, Esq., M.P., Robert Milligan, Esq., M.P., H. W. Wickham, Esq., M.P., the Mayor (S. Smith, Esq.), Edward Baines, Esq., W. E. Forster, Esq., J. H. Shaw, Esq., the Rev. Dr. Burnett (vicar of Bradford), and H. Pease, Esq. (Darlington). At this meeting resolutions were passed in favour of Mechanics' Institutes, as the means of diffusing useful information,—of the Yorkshire Union, which had by its exertions extended and supported these Institutions—and rejoicing at the prosperity of the Bradford Mechanics' Institution. During the day donations amounting to £51 16s. 0d. were made in aid of the Village Library Fund.

MEETINGS FOR THE ENSUING WEEK.

MON. Royal Botanic, 2.—Exhibition.
Chemical, 8.
Statistical, 8.—1. Mr. F. J. Minasi, "On a Decimal System of Coinage." 2. Mr. J. T. Danson, "On Trade with Russia in Peace and in War." 3. Mr. G. M. Bell, "Statistics of the Colony of Victoria." 4. Mr. T. A. Welton, "On Statistics of the United States of America."

TUES. Linnæan, 8.

WED. Royal Botanic, 2.—Exhibition.
Microscopical, 8.
Geological, 8.—1. Mr. J. Prestwich, jun., "On the Relation of the Lower London Tertiaries with the Lower Tertiaries of France and Belgium." 2. Mr. S. H. Buckle, "On the Fossil Foot-tracks in the Wealden Rocks at Hastings." 3. Mr. W. K. Loftus, "On the Geology of Parts of Persia and Turkey." 4. Rev. Messrs. Hislop and Hunter, "On the Geology of the Neighbourhood of Neghoor, Central India." 5. Prof. Owen, "On a Fossil Batrachoid Skull from near Neghoor."

FRI. Philological, 8.
Architectural Assoc., 8.—Class of Design.

SAT. Royal Botanic, 3¾.
Asiatic, 8½.—Mr. C. B. Greenough, "On the Rock Formations of India, with Especial Reference to their European Connexions."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 3rd, 7th, and 8th June, 1854.

Par. Numb.
244. Holt Forest—Return.
267. Bankruptcy Court (Ireland)—Return.
274. Guano—Return.
276. Harbours of Refuge—Return.
279. Committee of Selection—Thirteenth Report.
278. Henry Stonor—Report from the Committee.
224. East India—Return.
172 (6). Civil Services (Westmoreland Lock Hospital)—Detail of the Estimate.
255. Emigration—Return.
272. Revenues (India)—Account.
290. Criminal Code (Malta)—Copy of Despatch.
250. Shipping (Ireland)—Return (a corrected Copy).
119. Bills—New Forest.
121. — Church Building Acts Amendment (No. 2).
122. — Excise Duties (Sugar).
120. — Oxford University (as amended in Committee, and on Re-commitment).
123. — Common Law Procedure.
124. — Bills of Exchange (No. 2).
127. — Police.
Eastern Papers (Protocol signed at Vienna, on 23rd May, 1854), Part 9.

Delivered on 9th June, 1854.

285. Russian Dutch Loan—Account.
291. Church Rates—Return.
128. Bills—Literary and Scientific Institutions.
130. — Law of Landlord and Tenant (Ireland).
131. — Powers of Leasing (Ireland).
Department of Science and Art—1st Report.

Delivered on 10th and 12th June, 1854.

280. Electors—Return.
284. Sweets or Made Wines—Returns.
288. Burial Grounds (Metropolis)—Returns.
291 (1). Church Rates—Return.
292. East India—Home Accounts.
293. Wines—Return.
294. Army (Number of Persons flogged)—Return.
120. Bills—Oxford University (as amended in Committee, and on re-commitment, a corrected Copy.)

133. Bills—Judgment Execution, &c. (as amended by the Select Committee.)
Cuba—Copy of a Despatch.
Public General Acts—Cap. 15, 16, 17, 18, and 19.

SESSION 1852-3.

982. Customs Reform (Isle of Man)—Treasury Minutes.

Delivered on 13th June, 1854.

275. Army, Commissariat and Ordnance—Accounts.
129. Bills—Parochial Schoolmasters (Scotland).
132. — Bills of Exchange and Promissory Notes.

Delivered on 14th June, 1854.

287. Metropolis Turnpike Roads—Twenty-eighth Report of the Commissioners.
289. Endowed Schools (Ireland)—Returns.
135. Bill—Customs Duties (Sugar and Spirits) (amended).
Length and Weight—Report of Commissioners.
Poor Laws (Ireland)—Seventh Report of Commissioners.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 9th*, 1854.]

Dated 20th February, 1854.

406. W. Melville, Lochwinnoch, N.B.—Printing textile fabrics.

Dated 24th February, 1854.

459. W. Macnab, Greenock—Trunk engines.

Dated 6th March, 1854.

536. A. Barclay, Kilmarnock—Steam engines.

Dated 20th March, 1854.

658. C. A. B. Chenot, Paris—Steel, iron, and alloys.

Dated 1st April, 1854.

748. A. E. L. Bellford, 16, Castle street, Holborn—Breech-loading fire-arms. (A communication.)

Dated 6th May, 1854.

1020. R. Bulkley, New York—Extinguishment of fires.

Dated 8th May, 1854.

1026. C. Pfers-dorff, South row, Kensall New town—Aerial top.

Dated 22nd May, 1854.

1123. T. Alletson, Moorgate street—Flues and chimnies of furnaces.
1125. A. E. L. Bellford, 16, Castle street, Holborn—Looms. (A communication.)
1127. W. Church, Birmingham—Projectile.
1129. R. Crosland, and W. Holiday and J. Heaton, Bradford—Cast metal pipes.
1131. J. Blake, Greenock—Shackle hook.
1135. L. Sautter, Paris—Lighthouses and their lamps.
1137. F. Clark, King street, Whitehall—Fixing door spindles.
1139. J. B. Spencer and A. J. Melhuish, Shooter's Hill road—Photographic apparatus.
1141. C. Bostock and S. Greenwood, Manchester—Silk machinery.

Dated 23rd May, 1854.

1143. T. W. and G. J. Atlee, Birmingham—Printed forms for cheques, &c.
1145. J. Biggs, Ightham—Mariner's compass.
1149. J. Kuczynski, Paris—Baryta and its salts.
1151. C. Levey, Little Queen street, Lincoln's inn fields—Weaving bags and other tubular fabrics.

Dated 24th May, 1854.

1157. F. Lipscombe, 233, Strand—Guiding ships and boats.
1159. T. Clarendon and O. J. Gilsen, Dublin—Railway breaks.
1161. J. G. Jennings, 29, Great Charlotte street, Blackfriars, and R. Davenport, Jonathan street, Vauxhall—Kilns for burning pottery.

Dated 25th May, 1854.

1162. E. O. Aston and G. Germaine, Millwall—Mariner's compass.
1163. J. M. Chevron and C. V. F. de Roulet, Paris—Textile fabrics.
1164. J. Harrison, Fitzroy square—Pianofortes.
1165. E. Everall and T. Jones, Henrietta street, Brunswick square—Waterproofing fabrics.
1166. E. C. Mantraud, Paris—Phosphorus.
1167. L. M. F. Doyere, Paris—Purifying grain.
1168. J. W. Jeakes, Great Russell street—Stove grate.
1169. J. Packham, Brighton—Boilers for heating and circulating water.
1170. J. Mc Gaffin, Liverpool—Metal casks and tanks.

Dated 26th May, 1854.

1171. A. Livingston, jun., Portobello—Earthenware drain pipes.
1172. J. A. Corwin, Newark, U.S.—Knitting machinery.
1173. G. Chilson, Boston, U.S.—Furnace for warming buildings.
1174. S. Sweetser, Massachusetts, U.S.—Preparing skins. (A communication.)
1175. M. Loomis, Massachusetts, U.S.—Artificial teeth.
1176. W. Gossage, Widness—Smelting copper.

Dated 27th May, 1854.

1178. H. Distin, 31, Cranbourne street, Leicester square—Drums. (A communication.)
1179. J. Schmoock, Oxford street—Children's carriages.
1180. J. Hipkiss, Dudley port—Puddling furnaces.
1181. J. Murdoch, 7, Staple inn—Toy pistols. (A communication.)
1182. W. Stenson, jun., Whitwick collieries, near Ashby de la Zouch—Steam engine valves.

Dated 29th May, 1854.

1184. T. Bazley, Manchester—Glass furnaces.
1186. J. Evans, Abbots Langley—Paper.
1188. T. Taylor, Eddingley, Notts—Distributing manure.

Dated 30th May, 1854.

1192. F. Moordan, 13, Frederick place, Goswell street road—Inkstand. (A communication.)
1196. H. Doulton, High street, Lambeth—Junctions for sewers and drains.
1198. L. S. Middleton, Glasgow—Ornamental fabrics.
1200. H. Colby, New York—Altimeter.

Dated 31st May, 1854.

1202. J. MacFarlane, Renfrew—Steam boilers.
1204. J. Kent, 11, James square, Notting hill—Boats.
1206. W. E. Wiley and E. Lavender, Birmingham—Pens.
1208. C. C. E. Minié, Paris—Projectiles.

APPLICATION WITH COMPLETE SPECIFICATION FILED.

1257. N. Brough, Birmingham—Improvements in the manufacture of buttons, and in attaching them to articles of wearing apparel. (6th June, 1854.)

WEEKLY LIST OF PATENTS SEALED.

Sealed June 9th, 1854.

2861. Duncan Christie and John Cullen, both of 1, High street, Bromley—Atmospheric counterbalance slide valve for the steam engine, hydraulic, and all other machines in which the slide valve is used or required.
2865. Richard Eccles, of Wigan, John Mason and Leonard Kaberry, both of Rochdale—Improvements in slubbing and roving frames for cotton and other fibrous substances.
2866. James Sutcliffe, of Manchester—Improvements in steam engines, and in apparatus connected therewith.
2881. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in furnaces for the manufacture of steel.
2883. Nicolas Victor Guibert, of Paris—Improvements in forge hammers.
2895. Philip Grant, of Manchester—Improvements in printing presses.
2897. John Ambrose Coffey, of Providence row, Finsbury—Improved method of evaporating liquids.
2938. Joshua Horton, of Birmingham—Improvements in the manufacture of certain kinds of metallic vessels.
2988. Joseph Gaultier, of Paris—Improved apparatus for washing and bleaching.
250. John Burgum, of Birmingham—Improved self-acting damper for the furnaces of steam boilers.
580. William Mill, of 3, Hunter's lane, Birmingham—Improvement in inkstands or inkholders.

Sealed June 13th, 1854.

2890. James Wansbrough, of The Grove, Guildford street, Southwark—Improvements in the manufacture of waterproof fabrics.
2904. William Beckett Johnson, of Manchester—Improvements in machinery or apparatus for making bricks and other articles from clay and other plastic materials.
2939. George Anderson, of the Gas works, Rotherhithe—Improvements in apparatus used when manufacturing gas, which apparatus or part of which is also applicable when transmitting gas from one place to another.
229. Robert Chapman, of Eaton, Norwich—Apparatus for regulating the feed to millstones.
284. Dominique Deyres, of 16, Bateman buildings, Soho square—Improvements in drilling or boring.
323. Samuel Hunt and Thomas Morris, both of Long Eaton—Improvements in covering the roofs of buildings with slates, tiles, or other material.
325. Benjamin Hornbuckle Hine and Anthony John Mundella, both of Nottingham, and Luke Barton, of Hyson Green, Lenton—Improvements in the manufacture of knitted fabrics.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
June 9.	3599	A Thread Hoop	J. P. & E. Westhead & Co.	Manchester.
" 12.	3600	The Blankney Harrow	John Greenham	Blankney, near Sleaford, Lincolnshire
" 13.	3601	The "Manopla," or Double Wrist Band	Frederick Lack	90, Strand.

Journal of the Society of Arts.

FRIDAY, JUNE 23, 1854.

EDUCATIONAL EXHIBITION.

SATURDAY, JUNE 17.

The Committee met this day at five o'clock. Present, Harry Chester, Esq., Chairman of Council, in the chair, (in the absence of Earl Granville), the Bishop of St. Asaph, the Dean of Hereford, Col. Sykes, the Hon. H. Barnard, (Commissioner to the Educational Exhibition from Connecticut, U.S.), Mr. C. Fogh, (Commissioner to the Educational Exhibition from Denmark), the Revs. H. Baber, J. Barlow, H. W. Brookfield, W. W. Cazalet, D. Coleridge, H. Mackenzie, M. Mitchell, G. H. Owen, H. S. Rain, Dr. Rowden, and E. Ryley; Messrs. T. W. Allies (Secretary Catholic Poor School Committee), J. Boulden, Dr. Buist, H. Dunn (Secretary British and Foreign Society), J. Farnham, Dr. Guy, E. Hughes, W. G. Lumley, F. S. Marshall, J. S. Reynolds (Secretary to the Home and Colonial School Society), F. P. Sandford, and W. Tooke, F.R.S.

The Chairman stated that the Committee was called together for the purpose of hearing a report of the progress made by the several Sub-Committees since the last meeting of the Committee.

The Chairman then called upon the Secretary to report from the Correspondence Committee the state of the applications for space. The secretary reported that the applications from intending exhibitors were very numerous, and that 1,200 square feet of horizontal space, and upwards of 32,000 feet of wall space had been asked for, being about four times the space at the disposal of the Committee. That these applications were irrespective of the space required for the Foreign Exhibitors. All the leading educational societies and educational establishments would exhibit, and information had been received that articles were coming from France, Holland, Belgium, Sweden, Denmark, Holstein, Hanover, Seven Cantons of Switzerland, and the United States of America; sent by the respective Governments of those countries, as well as from private individuals. From Canada, New Brunswick, and Malta, articles have already arrived. The State of Connecticut, the Governments of Denmark and Sweden have respectively appointed the Honourable H. Barnard and Messrs. Fogh and Siljeström as their representatives at the Exhibition: the two former gentlemen have already arrived. As has been previously noticed in the Journal, the Council has sought and obtained from the Lords Commissioners of Her Majesty's Treasury, the privilege of admission duty free for all foreign articles intended for exhibition. From the joint Committee of Finance and Classification, the secretary reported that arrangements had been entered into with Messrs. Cubitt and Company, for fitting up St. Martin's Hall for the reception of the goods. From the Lecture Committee, he reported that Dr. Whewell, master of Trinity College, Cambridge, had undertaken to deliver the inaugural lecture "On the Material Helps of Education," on the 10th July, at three o'clock, to be followed by a series of seven lectures, "On the Sequence of the Sciences," by Professors De Morgan, Playfair, Forbes, Huxley, Henfrey, Dr. R. G. Latham, and Professor Creasy, and that numerous other lectures on subjects connected with schools and education would be given by eminent men whilst the Exhibition was open.

The Chairman stated that the Exhibition would be opened with a conversazione, on the evening of the 4th July, at which H. R. H. the President had intimated his intention of being present; that a private view would take place on the 5th, and that the Exhibition would be open to the public daily, on and after the 6th prox. The Chairman hoped that every effort would be made on the part of those interested in education, to afford the means for schoolmasters in the country to visit the Exhibition, and he had great pleasure in stating to the meeting, that the committee of St. Paul's school, Liverpool, had voted 10*l.* to defray the expenses of their master coming to London for that purpose.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The special Subscriptions for this object amount at present to only £818. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society who have not already contributed to the Special Fund for the Expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

SIXTH LIST.	£	s.	d.
Rev. Dr. Adler	1	1	0
James Anderton	1	1	0
Major Andrews	1	0	0
George Boulton	1	1	0
Messrs. Bradbury and Evans	2	2	0
J. C. Colquhoun	3	0	0
A. Angus Croll	5	5	0
Thomas Davidson	2	2	0
George Dawbarn	1	1	0
Robert Dawbarn	1	1	0
P. F. Debary	1	0	0
Viscount Ebrington	2	2	0
Professor Faraday, F.R.S.	2	0	0
Robert T. Fauntleroy	2	2	0
J. H. H. Foley, M.P.	2	2	0
R. H. Forman	1	1	0
John Foster	1	0	0
W. J. Fox, M.P.	2	2	0
E. N. Francis	2	2	0
Frank Franklin	1	1	0
J. Hambleton	1	1	0
Baron Hambro	5	5	0
W. F. Harrison	3	3	0
Dr. Heberden	5	0	0
B. Heldenmaier	10	0	0
Richard Leigh Holland	1	1	0
John Horton	1	1	0
Rev. W. T. Jones	0	10	0
W. Liston	2	2	0
W. S. Louch	1	1	0
Thomas Merchant	1	1	0
Rev. M. Mitchell	3	3	0
Henry Mogford, F.S.A.	1	1	0
Rev. G. Van de Linde Monteunis	1	11	6
S. Morley	5	0	0
Professor Moseley, F.R.S.	3	3	0
W. G. Prescott	5	0	0
Hugo Reid	0	10	0
J. S. Reynolds	5	0	0
C. B. Robinson	2	2	0
Rev. Dr. Rowden	1	1	0
David Salomons	10	0	0
G. F. Shillito	1	1	0
John Simon, F.R.S.	1	1	0
H. L. Smith	1	1	0
David Stow	5	5	0
Jelinger C. Symons, H.M.I.	2	2	0
C. B. Thurston	1	1	0
William Ward	2	0	0
Rev. F. Watkins, H.M.I.	2	2	0
W. Westley	1	1	0
C. Whittingham	3	3	0

PARIS UNIVERSAL EXHIBITION OF 1855.

An application having been made to the Council, at its last meeting, by the Philosophical Instrument makers of London, to be permitted the use of the Society's Great Room, as a place of meeting for making arrangements relative to the forthcoming Paris Exhibition—it was

Resolved—That the Council has much pleasure in announcing that the Great Room of the Society, when not engaged for the official business of the Society, is placed at the disposal of any trades meeting to promote the Paris Exhibition, and that the Secretary has been instructed to afford every facility in arranging for the use of the room.

At the same meeting the Council took into consideration the advantages which would be likely to accrue to Arts and Manufactures from visits made by the artizans of this country to the Paris Exhibition of 1855, and the numerous Artistic and Scientific Institutions, and are of opinion that timely and well organised arrangements might be made to conduce greatly to the economy, comfort, and usefulness of such visits; and that it would be desirable that measures should be immediately taken to induce the artizans of the United Kingdom to give attention to the subject, and make preparations for visiting Paris next year.

It appears to the Council, that the Institutions in Union with the Society offer excellent means for inviting the attention of the artizans to the advantages to be derived from a visit to Paris, as well as for organizing measures by which artizans may at once begin to make weekly deposits to provide for the necessary expenditure. The Council would therefore suggest, that a small special committee be formed in each Institution, and that a responsible treasurer be appointed to receive weekly deposits; but upon this subject the Council would be glad to have the opinion of the Conference to be held on the 4th of July.

As soon as the Council is sufficiently informed by the Institutions of the progress made, they will enter into negociations with railway and steam-boat companies, and collect and publish information upon lodgings, &c., in Paris.

As a committee of correspondence for this object, the Council has requested Lord Ebrington, Messrs. C. W. Dilke, De la Rue, Winkworth, Saunders, Bird, and Capt. Eardley-Wilmot, R.A., to act and receive communications.

Correspondence Relating to the Interests of British Manufacturers to Exhibit in Paris in 1855.

[Copy.]

Leeds, 8th June, 1854.

Sir,—In reply to your circular inviting attention to the French Exhibition of 1855, and also enclosing papers of particulars and conditions for exhibitors, we have to inquire of you what advantage, as manufactures, we may be expected to obtain by exhibiting, seeing that we are precluded by the French Tariff from taking orders, or sending out goods (woollens) into that country. You are aware the expenses attending will be great, and unless we can obtain some corresponding advantage therefrom, we are not disposed to incur the liabilities by exhibiting.

Yours respectfully,
JAMES WALKER & Co.

Captain Owen, R.E.,
Marlborough House, Pall Mall.

Department of Science and Art, Marlborough House.
Pall Mall, 15th June, 1854.

Gentlemen,—I am directed by the Lords of the Committee of Privy Council for Trade, to acknowledge the receipt of your letter of the 8th instant, in which you inquire what advantages, as manufacturers, you may obtain by contributing to the Paris Exhibition of 1855, and in reply, I am directed to say that whilst my Lords consider that manufacturers themselves are in the best position to judge what interests they may have in being represented upon this occasion, they would, at the same time, venture to point out that the advantage will probably arise from largely extended commercial relations between France and the United Kingdom.

You will not fail to observe that the invitation of France to the producers of this country is generous and pressing. The usual prohibitory duties on articles exhibited and sold have been reduced, first, to 30 per cent., and next, to 20 per cent. *ad valorem*, and an allowance will be made for any depreciation of value that may take place in the articles during the Exhibition. Moreover, manufacturers are invited, not merely to exhibit their productions, but to state the price at which they may be obtained.

The Imperial Commission proposes to pay the greatest part (see Article 20 of the Regulations) of the carriage of goods to and from Paris, and the arrangements generally are of a more liberal character than those which it was possible to make in 1851 towards foreign exhibitors.

A complete Exhibition of productions so little known in France as are those of this country, cannot fail to create a desire among the French people for those productions which British manufacturers may be able to supply better and cheaper than can be obtained in France itself, in return for such as France may be able to supply better for this country.

It cannot be supposed that the French Government would have taken this course, whereby the French people will be made fully acquainted with the character of British productions, and the facility with which they may be obtained, if the result were to be fruitless, and the French people exposed to mere disappointment in the gratification of wants which the Imperial Government had fostered.

It must also be obvious to you that not only these circumstances, but the well-known fact that the French Government is encouraging the erection of bonded warehouses for the first time in France, furnish proofs of its desire to extend the commercial relations between the two countries.

But it should also be borne in mind that not only will the productions exhibited at Paris be seen by the French people, but by a large concourse of the merchants of the world. Should any great producers hesitate to exhibit on so important an occasion, their absence might be prejudicial to their own interests, as it would subject them to the misapprehension that they shrink from so large a competition. Besides, Paris being a more central spot than London, and not separated from the rest of the Continent by a sea-passage, there is every probability that the approaching Exhibition will be visited by a larger number of persons from all countries than that in London.

My Lords think it must be superfluous to urge upon yourselves, and other large producers of the United Kingdom, their confidence that all will be animated by a desire to assist, at least, in maintaining the national credit for courtesy towards the French nation, by reciprocating in the Exhibition of their productions, the great and successful exertions which the French made in displaying their productions in 1851.

I have the honour to be, Sir,
Your obedient servant,
(Signed) H. C. OWEN, Capt. R.E.

Messrs. James Walker and Co., Leeds.

Leeds, 17th June, 1854.

Sir,—We are in receipt of your letter of the 15th instant, in which, by direction of the Lords of the Privy Council for Trade, you answer our enquiries of the 8th instant, respecting the French Exhibition. We have now to inform you, that we consider your arguments conclusive in favour of our becoming exhibitors, and shall apply for space accordingly; but as individual exhibitions will not make a proper show for a district like this, we would suggest the necessity of your getting up an aggregate meeting of the trades through the Mayor, or

Chamber of Commerce, to take steps for organizing a proper committee and providing funds, and generally to see to the proper representation being carried out, as in 1851.

We may also add, that, we consider your letter so well calculated to meet the objections of other persons likely to become exhibitors, that we had it inserted in the three Leeds papers of this day, a copy of which we herewith enclose for your perusal.

We are, Sir, yours respectfully,
JAMES WALKER & CO.

Captain Owen, R.E.,
Marlborough House, Pall Mall.

ON THE COMBINATION OF FIRE-EXTINGUISHING WORKS, WITH THOSE FOR THE SUPPLY OF WATER FOR DOMESTIC AND OTHER PURPOSES.

By Lady Bentham.

Happening to possess a greater number of authentic documents respecting fire-extinguishing works than could be found in other hands, and conceiving that the subject may be deemed not unworthy of consideration by the Society of Arts, I venture to take the liberty of submitting an abstracted notice of the origin of such works, their successful application, their proposed extension to the metropolis, and the causes which in certain cases have occasioned failure. It would seem that discussions on the subject, if permitted by the Society, would lead to important results,—for instance, to a more general adoption of fire extinguishing works in the metropolis and elsewhere; they might do away with objections that have been made by water companies, and doubtless would tend to the preservation from fire of many a public building.

Towards the end of the last century the best means that then existed for the extinguishment of fire consisted of hand-engines, most of them small-sized parish engines; of a few more powerful ones, the property of Insurance Companies, and worked by men in their employ; of hand-engines in some large towns, also in various public establishments. The supply of water to these engines was often from a distant source, and various delays were experienced before the engines could be set to work.

In this state of things the late Brigadier General Sir Samuel Bentham, then Inspector General of Naval Works, on the 13th February, 1797, addressed to the Admiralty the "Outline of a proposal of a new mode of supplying water to his Majesty's fleet, as well as to the several naval establishments at Portsmouth and elsewhere." That proposal included fire extinguishing works, and was as follows:—

"Considering the immense losses that have been sustained in consequence of the devastations of repeated fires in his Majesty's dockyard at Portsmouth, and the high importance therefrom arising of some more effectual means of securing the stores and buildings from such accidents in future; considering also how very ineffectual to the suppressing fire which has already taken place among the inflammable stores in a dockyard, any quantity of water must be, that can, with the utmost alacrity, and under the most favourable circumstances, be thrown by means of any of the engines used on such occasions, it appears highly expedient that when any steps are taken to procure an ample supply of water for other purposes, so to manage that supply as it shall at the same time afford the best possible security against the ravages of fire.

"With this view I would propose that tanks, or reservoirs, be formed on the tops of some of the highest buildings in the dockyard which are sufficiently strong for the purpose. That pipes of a large diameter be laid from these reservoirs to all parts of the dockyard where buildings of importance are situated, or where ships can lie, the situation of the reservoirs being sufficiently elevated to force the water through these pipes to the greatest height required, without any other assistance from engines or manual exertion. These pipes being buried, for their security, two or three feet under ground, should have *branches rising from them* wherever they might be thought necessary, and which branches should be prepared, for the *ready affixture of a hose* like that of an engine hose only larger.

"In case of fire, or on the want of water for any other purpose at any particular spot, all that would then be to be done would be to fix one of the hose prepared for this purpose to the branch nearest to the spot in question, and to turn the cock, whereby a quantity of water far beyond what is ever thrown by an engine, would be made to issue from the hose, and with a force sufficient to enable it to rise to a height greater than that of any ship afloat, and equal to that of the upper floor of any building in the yard.

"The number of wells already made in the yard, and the springs discovered there during the carrying on the under ground works, give reason to conclude that a sufficient quantity of good water for all the purposes of this port may be easily obtained within the limits of the dockyard. I would propose, therefore, that an additional well, or wells, be dug in places the most suitable, and that the water thus obtained be raised by means of pumps out of the well immediately to the reservoir above mentioned.

"For the working these pumps the force of a steam-engine might be applied during the night, leaving the force by day to be appropriated to the giving motion to other machinery.

"The pipes above described for the purpose of security against fire, being brought to the sides of the basin, to the jetties, and the wharves, boats, or watering vessels, might be thereby filled wherever it was most convenient; and the ships themselves whilst lying to fit might take in as much of their water as might be thought proper immediately from the pipes. These pipes might be extended without the limits of the dockyard to the gun-wharf, victualling premises, barracks, and other public establishments; and it is very probable that the quantity of water might be sufficient at the same time to supply the wants of the inhabitants of the towns of Portsea and Portsmouth. * * * Such an undertaking on the part of Government, would at least be of this service to the inhabitants, namely, that of showing them the facility with which an abundance of good water may be obtained in their own neighbourhood.

"The whole expense of supplying the water for all the purposes, public and even private, for which it could be wanted at this port, including all the apparatus for raising and distributing the water in the advantageous manner above mentioned, would, it is conceived, amount to but a small sum compared to that mentioned as the probable cost to government for the simply bringing the water from Titchfield to the several public establishments, as stated in the proposal on which my Lords Commissioners of the Admiralty directed me to give an opinion.

"The reasons for affording the security above-mentioned to the naval establishments near Portsmouth, seem equally to apply to *all other establishments elsewhere*, in proportion to their importance. Where the establishment is less extensive, the expense would be proportionately less. In the instance of Plymouth yard, the water is already sufficiently elevated to be laid on according to the mode proposed without the necessity of raising it by machinery.

"SAMUEL BENTHAM.

"Portsmouth, 13th, Feb., 1797."

The above proposal enumerates all of the essential works that have since been adopted in apparatus for arresting conflagrations, namely:—

1st. The obtainment of abundance of water.

2ndly. The formation of reservoirs at a sufficient elevation to throw water from them to each and every part of the premises to be protected.

3rdly. The having mains always charged with water, and connected with those reservoirs.

4thly. The application of steam-power to the raising of water when that in the reservoirs should be exhausted.

5thly. The providing the mains at frequent intervals with fire-cocks, they being prepared for the ready screwing on of hose.

6thly. The combining fire-extinguishing apparatus with works for the supply of water for domestic and other purposes on land and for ship uses, and thereby ensuring constant readiness of the whole apparatus for immediate use.

The Lords of the Admiralty having ordered the digging of one well, it was completed, and on the 27th September, 1801, the Inspector-General informed the Admiralty that "it had for many months been found to yield an abundance of excellent water;" he, therefore, submitted to them various details for carrying into execution his proposal of 1797, particularly the laying of pipes for the supply of ships in the basin, or at the jetties; that "the apparatus provided for this purpose may likewise, with the assistance of the steam engine and machinery already erected for other purposes, be so arranged as in case of fire to afford the means of throwing large quantities of water over any of the buildings, as well as over any of the ships lying contiguous to the yard." He proposed a pump of 8 inches diameter, connected with the well of fresh water, and delivering into a tank at the top of the engine-house; that, branching out from this principal short 8-inch main, one of 6 inches diameter be led along the northern part of the yard, and joined again into the 8-inch main, and another set of 6-inch mains be led along the southern part of the yard, also joining into the 8-inch main; "that along the whole extent of these mains, at an average of about 100 feet, there be inserted a short branch reaching to the surface of the yard, and provided with a cock prepared to receive a flexible hose." He farther proposed the fixing a large forcing-pump in the salt-water well, in such manner as to be used in conjunction with the other pump, for either lowering or heightening the level of water in the basin; for pumping the docks; or for supplying water to the mains in case of fire, so that water in great quantities might, on the occurrence of such a disaster, be thrown into the whole series of pipes, and forced through them by the full power of either of two 50-horse steam-engines, as also by that of the action of the enormous chain-pumps he had caused to be provided for pumping into or out of the basin. He represented to their lordships that "by conducting the pipes circuitously to the distant parts of the yard, so as to connect each of these mains at *both* ends with the principal main, besides a more advantageous distribution of the water throughout the yard than can be obtained by the ordinary mode by a main connected at one end only, and having detached branches, there would be gained two distinct advantages of considerable importance: First, In case of any extraordinary demand for the delivery of as much water as possible at any particular point, as on the event of fire, the supply of water would by brought through *both* ends of the 6-inch main at the same time from the principal or 8-inch main, so as to flow in twice the quantity that could be furnished by a pipe of the same bore were it to issue from the principal main in the usual manner, without returning to it. Secondly, In case of an accidental obstruction in any part of these mains, or in case of the necessity of stopping any part for the purpose of repair, or for making any addition to them, still the water could be conveyed to all other parts of these mains from one or other of the ends without impediment."

This particular part of Sir Samuel's invention has not, to my knowledge, been adopted in any water works, notwithstanding its evident advantages; for although the Portsmouth water works, and their efficiency in extinguishing fires, have been known to the public for half a century, the details of their arrangement have been buried in official communications. But the above specified advantages are not the only ones derivable from a similar arrangement of mains, since great saving in original outlay must necessarily result from the substitution of pipes of smaller diameter than would otherwise be necessary; and, possibly, the scanty supply of water sometimes complained of on the occasion of conflagrations, might be obviated, in many instances, were the supply given in a double direction instead of a single one. In regard to the forcing pump proposed, he stated that its situation was particularly advantageous, as it commanded an inexhaustible supply of water from either of the basins, and from the harbour itself; and he added that the bringing this pump into frequent use seemed important as a means of securing its being in a state of constant readiness for its more particular use, in case of a sudden alarm of fire. The estimate for the whole of the above-mentioned works amounted to 6,403*l*. 8s., including 10 per cent. for contingencies. Sir Samuel's plan having been ordered for execution, he from time to time furnished the requisite drawings and details, and when completed the management of these works was confided to him, that is in as far as it did not interfere with the police of the yard, for which the Commissioner was responsible; all that the inspector-general could therefore do was to give such *written* instructions to the master-millwright, an officer under his individual control, as would ensure a perfect state of the whole apparatus, and that four men, well acquainted with the works, should nightly remain in the engine house, ready to put them to use in case of fire.

In 1805 he was despatched to Russia on a ministerial mission, which prevented the preparation of detailed plans for fire or water works for other dockyards; but soon after his return home, namely on the 8th April, 1808, he furnished the Navy Board with a detailed description of the Portsmouth water and fire-extinguishing works. He stated that water had been obtained in the well at a depth of 274 feet below the surface of the ground, and that the water was soft and pure; that the stop-cocks were to the full bore of the mains; that the fire-cocks were of 2 inches bore, that being the largest diameter of the fire-extinguishing hose; that in the wood mills extraordinary precautions were taken for the extinguishment of fire, "for from each of the two cisterns over the two principal buildings a three-inch pipe is brought down into each of the floors below, and into this pipe on each floor a fire-cock is fixed, with a hose always screwed upon it in readiness for throwing water, on simply turning the cock; and another cock is fixed for drawing water into buckets." On this occasion Sir Samuel recommended an addition to the original works; it was a forcing-pump to be worked by men by means of a capstan. The commissioner resident at the yard, Commissioner Grey, had suggested the forming of a common pump, the inspector-general adopted the idea, but proposed a *forcing* pump instead of a common one, and devised its construction in such a manner as that it should be no obstruction to the business of the yard; the pump itself he contrived to place underground, and that it should be worked by a capstan, the bars of which being removable at pleasure, the standard of it would be the only part permanently above ground. This might seem a superfluous addition to the Portsmouth works, supposing them to be kept constantly in an efficient state, but as the cost was but little it appeared to be worth encountering as an additional precaution. On the 12th April of the same year, Sir Samuel submitted to the Admiralty a plan for water and fire extinguishing works at the several principal dockyards; and conformably to his proposal of 1797, those at Plymouth, to be without the aid of a steam-engine, the head of water being of sufficient elevation to supply the works naturally.

Though the efficiency of the Portsmouth works in question had been abundantly proved on several occasions when fire had broken out there, yet he thought it desirable to have their competency exhibited in his own presence. Accordingly, on the 25th June, 1811, he caused them to be tried. I was myself present at the experiment, and

had to note down the several particulars; six hose could be worked simultaneously, each of them throwing water to the height of 70 feet from the ground, and to a horizontal distance of 110 feet from the nozzle of the flexible pipe, that is in height and distance, far over the highest buildings in the yard. On the 8th June, 1811, a destructive conflagration broke out in Plymouth dock-yard; the fire-extinguishing works there, though in a state of progress were still very incomplete, but Mr. Mitchell, who had been selected by Sir Samuel to superintend the execution of his plan, had always, as far as the pipes were laid, kept them full of water, and thereby on this occasion saved many costly buildings from destruction. At this yard also a forcing pump formed a part of Sir Samuel's plan, similar to that he had designed for Chatham yard; that is to raise and force upon a fire about a ton of water per minute, by the power of from 60 to 80 men applied to the capstan bars, the men progressing at the rate of 2¼ miles per hour. A peculiarity of this pump was the providing it with *two* suction-pipes, thereby to balance the weight of water; and in fixing the apparatus great attention was paid to facility of getting at the working parts in case of their derangement. It will be seen hereafter that this forcing pump saved from destruction by fire a vast amount of public property.

In Sir Samuel's "Design for a new dockyard at Sheerness," Feb. 1812, he proposed "that water-works should be provided for the more perfectly filling or emptying the several receptacles, such as basins, or docks, for which sea water is requisite—for supplying fresh water to all habitations and various other buildings, as well as to ships and boats, immediately from exterior and from interior wharves, as also for forcing water, fresh or salt, through a system of pipes throughout the whole of the arsenal, and its immediate vicinity, to the height necessary for extinguishing fire in the highest buildings; and for *giving or transmitting motion in some cases to machinery along the range of the pipes.*" His office having being abolished in the same year, the improvement of Sheerness yard was confided to a private engineer, who made no provisions of either water or fire-extinguishing-works, other, indeed, than that of the deep well which Sir Samuel had already caused to be made, and which furnished abundance of most excellent water for the supply of the fleet, instead of, as theretofore, bringing all the water required for that purpose in boats from Chatham. The Mr. Mitchell above mentioned, and who was fully conversant with Sir Samuel's water-works, having been removed from Plymouth, and become civil engineer of Sheerness yard, for several years attempted in vain to protect it from fire by such works as had been found so efficacious in the other principal dockyards. This gentlemen retired from the service, but hearing that he could furnish many particulars that were unknown to me, I in December last requested him to favour me with information on the subject of Sheerness; the following is his reply, which with his premission, I copy from his letter to me:—

"5, Devonshire-street, Islington, Dec. 1853.

"Dear Madam,—On my first entrance to Sheerness dock-yard, in 1819, the only means for extinguishing fire were by the water from a cistern, holding 100 tons of water, raised about 16 feet high, and supplied by the navy well at the rate of about 15 tons per hour, and that of having casks of water placed at different parts of the yard, which, on the event of fire, were rolled to the place of the fire to supply the extinguishing engines. In the progress of the new works of the yard I had often been impressing on the authorities the importance of an efficient system of fire-extinguishing works, but to little or no purpose, until, about July, 1827, a fire occurred in the town so close to the dock-yard that the windows of my house, which was within the yard, were quite scorched. In this fire 64 houses were consumed; and after this some little was done, but not to the extent that I proposed. Again, about the latter end of the year 1829, another fire occurred, which consumed about 46 houses, when I again urged more forcibly the necessity of a system of fire-extinguishing works; and on the 5th January, 1830, an answer was received, enquiring what had been done, and if the system could be carried out with little expense. I was by this cramped and prevented from carrying my plan out to the extent I intended, and limited the expense to £1,000, using old pumps, and other materials in the yard; and that these works should throw a thousand gallons of water 150 feet high per minute by the steam-engine. Notwithstanding this low estimate, several vexatious mutilations were made in my plan until about the year 1832, when Sir James Graham, being then First Lord of the Admiralty, on his first visit of inspection to Sheerness yard, made many particular enquiries with respect to the supply of water for the fleet, and on the event of fire. I had then the honour of submitting to him my plans, which embraced both these purposes, of which he highly approved, and gave orders for some of the works to be carried out forthwith, especially that of a tank at the victualling store-house for the supply of the fleet, and he also instructed me to make out drawings and estimates to be forwarded to the Admiralty. This was done 22nd June, 1832, * * * but several changes having been made at the Admiralty, the works were still retarded in their progress until 1839, after the great fire at Plymouth, when the present system was allowed to be carried out, more particularly the double lines of pipes, one for fresh water, for the daily purposes of the yard and supply of the fleet, the other line for salt water on the event of fire, for watering and laying the dust in the yard, &c., &c., but both applicable to one purpose if required, especially on the event of fire, which together were capable of throwing about 10 tons of water per minute over any ship or building in the yard."

By a former letter from the same Mr. Mitchell, 28th July, 1851, it appears that "in the double line of pipes I had a further view of their utility and applicability, for, by a simple hydraulic motion attached, water could be transmitted from the steam-engine to perform various operations in different parts of the yard; one object was that of working the capstans of the masting sheers, which now requires 200 to 300 men, according to the size of the mast, and for which pipes are already laid; also to work cranes for loading and unloading ships; to work store cranes in taking stores up and down in the storehouses; to stack and unstack timber; likewise working capstans by the dockside in all parts of the yard; besides various other operations now performed by manual labour." Mr. Mitchell also introduced at Sheerness "air vessels attached to all the force-pumps for supplying water to the pipes. * * * I have for many years seen the necessity of air vessels placed at intervals on the lines of water-pipes for preventing them from sudden shocks, as in the shutting of stop or fire cocks, and the especial danger when, on the event of fire, the cocks are liable to be shut instantaneously.* * * The air-vessels at Sheerness are placed on different parts of the lines of pipes, and are each 16 times the capacity of the forcing-pumps, so that either of the steam-engines may stop a few minutes without its being materially felt."

Sir Samuel Bentham, not long after the abolition of his office, retired to the Continent. During his residence in France he did not lose sight of the protection afforded to property by works of the same nature as those above specified, and on his own estate provided an ample supply of water, raised by mules from a well, nearly 100 feet below his chateau, and the farm buildings that surrounded the back court-yard of it, the water being stored in an ample reservoir. Well it was that this had been done, for on the outbreak of a fire in the farm stables, that reservoir afforded an immediate supply of water, available on the instant, and until the mules could raise a further supply. The stable in which the fire originated was, indeed, destroyed, but many farm buildings, and the chateau itself, were thereby saved.

After Sir Samuel's return to England, his attention was roused by repeated conflagrations in the metropolis, and

he devised the application of the water-works of London to the prompt extinguishment of fire, on the same principle as that he had so successfully introduced in the Royal dockyards. He communicated his project to his friend Sir Herbert Taylor, who, being struck with its importance, advised its author to state his ideas, in the shape of a letter, to the late Sir Robert Peel, and Sir Herbert undertook to present it himself to the Prime Minister. The outlines of a plan were accordingly drawn up, and so presented. The following are extracts from the more important parts of that communication:—

"To the Right Hon. Sir Robert Peel, &c., &c., &c.

"Lower Connaught-place, Feb. 1830.

"Sir,—The sensation produced by the late destructive conflagrations has at last induced me to communicate a plan which occurred to me some time ago, for the better security of the metropolis against the ravages of fire. It cannot be considered in the light of an untried project, for it is grounded on the efficiency which has been experienced of the water and fire-extinguishing works which, according to my proposals, made in the years 1797 and 1801, were introduced first in Portsmouth dockyard; and similar works have since been executed in the other principal dockyards.

"As in regard to Portsmouth dockyard the efficiency not less than the economy of the works in question depend on their being combined with water-works for other purposes, and with the steam-engine for manufacturing purposes, so with regard to the metropolis it appears to me that works already existing might be made the basis of the plan I have to suggest; thus the expense to be incurred compared to the object in view would be light, and the efficiency of the fire extinguishing apparatus would be secured in a manner much more certain than it could ever be expected to be if made for this purpose alone. To give an idea of the plan I have in view, it may be best to transcribe a part of one of my official communications on the subject."

The letter proceeded with a description of the Portsmouth works, the more important particulars of which have been already mentioned in this narrative, and he added that, "In regard to the efficiency of the fire-extinguishing works at Portsmouth, several alarming fires have broken out there since they were established, but the vast quantity of water promptly thrown upon the flames by means of these works have always extinguished the fire before it could make any progress." He then entered into particulars of his plan for the metropolis, premising that it was supplied by mains with water under a pressure sufficient to carry it to the top of the highest dwellings, and said, "There were two ways in which the existing apparatus might be adapted to the extinguishment of fire: 1st. By such an alteration of the plugs as should enable hose to be screwed upon them. * * * 2ndly. by adapting in front of each house, where it might be thought desirable, lesser screw-plugs, ready for screwing on a hose * * *. The whole expense attendant on these alterations would consist in the alteration of the plugs, and the provision of suitable hose; the first could be made wholesale at a trifling cost. The large hose would of course be a public concern. * * * The smaller plugs being peculiarly suitable for application at the first moment of fire being discovered, this small hose might be provided by private householders, and kept if desired on the premises themselves. * * * * In addition to these means of converting the existing water-works into fire-extinguishing works, it may be observed that there already exist in London many deep wells, capable of affording a great supply of water, and steam-engines often on the same spot, with forcing-pumps for raising water; these, wherever thought desirable, and where permission could be obtained from the proprietors, might be connected with the general system of pipes. * * * * In particular buildings of great value, or of a peculiarly hazardous nature—such as libraries, manufactories, theatres, &c., an apparatus might be introduced in the interior, such as is above described as existing in the wood-mills at Portsmouth; and forcing-pumps might also be applied to any of the public wells."

The letter went on to observe, that however efficient fire-extinguishing works might be in themselves, no dependence could be placed on them unless they were kept ready for prompt use in times of need; and it gave instances of late failures of the existing apparatus in London from causes that were avoidable; such as the freezing of the fire-plugs on the occasion of the Argyll fire, which might have been obviated by the simple expedient of filling up the plug-holes with wooden plugs; the time lost in finding and rousing of turncocks before water can be obtained. "To remedy this, means of turning on water should be in the hands of persons awake, and, it may be said, on the spot, whatever be the part of the town; such persons exist in the police," and he proposed that their truncheons should be made applicable to the turning on of water, without rendering them either cumbersome or heavy; adding, "if it be called to mind how very frequent the occasions are when such delay has occurred, it may well be thought worth while not to reject a suggestion of this nature, because it professes to effect an important purpose by very simple means."

After various other details, the General went on to say, —"In order to insure the readiness for use in case of fire of the whole apparatus, the keeping it in constant use would be the most effectual; the steam-engines at water-works, for example, might work at night as well as in the day with advantage to the proprietors; but even were they not to work in the night, the fire might be damped-up, ready to make the engine start at any time; and for ensuring the sound state of the hose, it might be used for watering the streets, instead of sending carts about with water for this purpose." He then describes various minor contrivances that were in use in foreign countries for securing life and property from conflagration; and said it was desirable that the new police should be furnished with instructions for their guidance in case of fire. He instanced occasions on which the prompt application of trivial means had extinguished fire, as, for example, by throwing a wet blanket over a chimney in flames, and concluded with the observation, that government had at its command the services of the machinist of Portsmouth dockyard, Simon Goodrich, Esq., who had afforded much assistance in arranging details of the water-works there, and had carried into execution the fire-extinguishing works in the other dockyards.

In a note subjoined to the above, Sir Samuel noticed that fire-extinguishing works, on the plan of those at Portsmouth, had lately been provided for the protection of Windsor Castle.

The late Sir Robert Peel, on considering this proposal, was of opinion that the public mind was not yet ripe for the introduction of the plan. At the same time, the late eminent engineer, Henry Maudslay, informed the General, that many of the insurance companies would oppose the measure, they thinking it subversive of their interests; so that Sir Samuel took no further steps for the introduction of it.

Lord Lincoln, in the year 1844, brought in his bill "for the better security of the metropolis against fires," when Sir Samuel's above-mentioned proposal was submitted by me to his Lordship. Possibly it might never have come under his cognizance, though it was safely delivered at his office.

It can hardly be doubted but that the successful operation of the fire-extinguishing works at the several dockyards, particularly the combination of those works with those for the supply of water, led to the adoption of similar ones in various British towns, as well as at Hamburgh. After the dreadful conflagration that destroyed great part of the latter city, a British engineer was charged with the introduction of efficient water-works. This gentleman's plan appears to be, excepting in one of its details, an exact copy of the Portsmouth and Ply-

mouth works. That detail is, that at Hamburgh the stem of the delivering-pipe is curved at the upper part, for the purpose of screwing on *two* hoses, whereby the jet of water cannot but be diminished. By Sir Samuel's plan the *straight* orifice leading directly into the hose, prevented the loss of any force by curvature of the stream. The successful operation of the Hamburgh works has been tested on various occasions of fire in that city; and, so far from injury to the interests of fire insurance companies, they have been enabled to lower their premiums in all those parts of the town where fire-extinguishing apparatus has been introduced.

Understanding, in July, 1851, that it had been stated to the Select Committee of the House of Commons, that a continuous supply of water to the metropolis was not to be depended on, and by reason of occasional repairs to the water-pipes, or of accidental obstructions in them, I took the liberty of submitting to the Committee that this objection had been obviated by Sir Samuel Bentham, in the works he had devised for Portsmouth Dockyard, in which water was delivered by two *different* courses to every important part of the yard.

It having been suggested that the General Board of Health would feel an interest in the communication of what Sir Samuel had done, in respect to water and fire-extinguishing works, copies of his proposals of 1797 and of February, 1830, were furnished to that Board. They were pleased to cause me to be informed by their Secretary, "that they had perused the statement with much interest—that the system so long ago suggested by Sir Samuel Bentham has now for some time been in successful operation in various towns—and that the General Board of Health, unaware of Sir Samuel Bentham's proposition, have, in their recent report on the supply of water to the metropolis, laid considerable stress on the importance of adopting similar means for London;" and then referred to pages 231 to 261 of their Report. It may seem remarkable that the General Board of Health should not, in their investigations, have heard of the water and fire-extinguishing works in the Royal Dockyards, since several circumstances had given them notoriety, though the plan for adapting the water-works of London to the same purpose was less known, although it had twice been submitted to Ministers of the Crown.

It appeared in the newspapers of May, 1852, that a fire had broken out in Portsmouth Dockyard, and that it had been extinguished by hand-engines worked by men, the fire-plugs and hose attached to them having been used, it is true, but for the sole purpose of supplying hand-engines with water. I, in consequence, requested Rear-Admiral Prescott, then Admiral-Superintendent of that yard, to favour me with information on the subject. The Admiral most courteously caused a memorandum to be drawn up for my satisfaction—as he said—and by which I should "see that his (my husband's) valuable arrangements have not been allowed to fall into desuetude, and, in some respects, are naturally improved and enlarged." From the memorandum which was enclosed, and which is given at length at the end of this article, it appears,—1st. That additional cisterns have been constructed, and that it is salt water with which they are supplied.—2ndly. That these cisterns are each of them supplied by *its own set of pumps*, and have their respective sets of mains—It must be observed that this provision of a *separate* set of pumps and *separate* mains, is subversive of a fundamental principle adhered to in all Sir Samuel's arrangements, namely, that every part of the apparatus should be contrived to serve as many different purposes as possible, thereby ensuring their constant readiness for use.—3rdly. That there are powerful hand-engines at well-known stations. So Sir Samuel not only provided hand-engines, but gave them specially in charge to his master-millwright, who was made individually responsible for their being always in the best state for immediate use; but it is a considerable improvement that they should be kept at different parts of the yard, at "well-known stations." So the hose-reels greatly facilitate the conveyance of hose from place to place; the General Board of Health state that such are in use at Liverpool.—4thly. That "at night the pumps could be scarcely set to work in less than twenty minutes." It was for this reason that Sir Samuel always insisted on the need of elevated reservoirs of water, sufficient in capacity to furnish a supply till the pumps could be brought into action. In his time a few minutes —three or four perhaps—would only have been required; for the steam-engine at the Metal Mills was in constant use, night as well as day; and, by his regulations, four men conversant with the fire-extinguishing works were always in the engine house, by night as well as day. Now that those engines are never worked by night, more capacious reservoirs are indispensable; but this may suggest the expediency of keeping one engine constantly at work, though it were but for pumping purposes. Indeed, the filling capacious reservoirs with *salt* water precludes the use of it for domestic purposes, and, consequently, the insurance that frequent use can alone afford that the whole apparatus is in an efficient state.—5thly. The two remaining paragraphs seem intended to answer my particular inquiry, namely, whether the hose attached to the fire-cocks had been applied to the extinguishment of the fire, or whether only for the supply of water to hand-engines? But a direct reply to this question is evaded in the memorandum, and Admiral Prescott's letter affords no information on the subject, so that it may be concluded that the intended use of those hose *had* fallen into desuetude. As to the practice of laying a hose at night on board of every ship in or contiguous to the yard, it cannot but be considered a desirable precaution, though experience had proved that the hose attached to fire-plugs had promptly extinguished fire on board of a ship at one of the jetties; and it should not be lost sight of, that hose screwed on to fire-cocks are provided for prompt use by night as well as by day. The fire of 1851 broke out by day, and at a time when all the operatives in the yard were at their work, so that hands were speedily collected to work the hand-engines; but far otherwise would it have been by night, or even at meal-times; whereas by using the fire-works, half-a-dozen men would have sufficed for throwing water from half-a-dozen large hose upon the flames, by night no less than by day.

On the 4th of April, 1853, I took the liberty of furnishing the Lords of the Admiralty with an abstracted account of the means already taken to arrest conflagration in her Majesty's dockyards; and on the following day submitted to their Lordships a proposal for a very partial adoption of Sir Samuel's invention, merely for the protection against fire of the Admiralty and of Somerset House. Aware of the many difficulties that stand in the way of the adoption of his plan in regard to the metropolis itself, it appeared to me that it might be advantageously introduced by their Lordships for the security of buildings completely under their control. The project, should it be adopted, would serve as an example of the facility with which the existing water-works of London might be employed for the very prompt extinction of fire, and how trifling would be the expense incurred. The project also indicated that Somerset House would exemplify the simple expedient of depending alone on the head of water at a level much above that of the building, whilst the Admiralty would show how easily the force of a steam-engine might be adapted to the throwing water over high edifices. The further liberty was taken of suggesting to their Lordships the expediency of introducing fire-extinguishing works in all her Majesty's naval establishments, and that, as a regular police is now established in them all, that some of those men being *always* on the spot, they should all be instructed in the use of such works, and be habituated to their employment by laying dust with them, washing the exterior of buildings, and so forth. Their Lordships were pleased to command their Secretary to give their thanks for these suggestions, but whether measures have been taken for their adoption has

not transpired. On the 14th of last April, the liberty was also taken of suggesting to the Earl of Aberdeen the expediency of adapting fire-extinguishing works to public buildings generally.

Unfortunately experience has shown that a neglect of constant use in other than fire-extinguishing works has too often caused fearful disasters; but as the present communication is confined to fire-extinguishing apparatus, it suffices to record some few instances in which its constant readiness for use have been successful, and, on the other hand, to note failures consequent on either neglect of the works themselves, or from ignorance of the manner of applying them to use.

Many are the examples afforded in Portsmouth dockyard of the promptitude with which fire was extinguished there whilst Sir Samuel Bentham was charged with the management of the water-works, but particulars of these occurrences would be an unwarrantable encroachment on the Society's time: to pass on, therefore, to an example of great national interest, the fire that broke out last year in Windsor Castle. It has above been seen that works, similar in a great measure to those at Portsmouth, had been established for the protection of that Castle, when the plan for the metropolis was submitted to Sir Robert Peel. Since that time, I have understood that a very capacious reservoir has been added to those works, so that a profuse supply of water from that elevated reservoir is always at command. According to a good account of the accident in March, 1853, "all the passages and staircases in the Prince of Wales' Tower were filled with smoke to an extent that rendered traversing them exceedingly difficult. Happily all the staircases were furnished with an excellent supply of water, with *hose* and *fire-cocks* on every landing. These were *well-understood* by parties in the Castle, and, notwithstanding the difficulty arising from the heat and density of the smoke, very little time was lost in getting to work. * * * Under the guidance of Mr. Turnbull, the clerk of the works, the hose had been attached to various fire-cocks in different parts of the Castle, and an immense quantity of water was poured into those rooms where the fire was most perceptible." Hand-engines were indeed brought from Windsor to the Castle, but, though they were zealously worked, it appears that the extinguishment of the conflagration was due to the works that had been copied from those at Portsmoth.

The mischievous consequences that attend *neglect* of fire-extinguishing works themselves, and of *want of knowledge of their use*, and promptitude of action, are but too numerous. In the way of example of disasters that have occurred in Royal dockyards from these causes some instances have been afforded me by the above-mentioned Mr. Mitchell, probably the only living officer conversant in such matters, who has had an intimate knowledge of dockyards for more than half a century, whose veracity, it is believed, may be relied on no less than his skill and powers of observation, and who has kept plans and notes to which he is in the habit of referring. In Mr. Mitchell's note to me of the 31st December, 1853, he says—"When first I went to Plymouth yard, in 1810, the only means they then had of extinguishing fire was from a pipe that delivered water at the gate, led to different parts by canvas hose, by which also the ships were watered, and which was in charge of a man who was allowed to take away the key of the house where all the canvas and other hose and fire-buckets were kept. This man lived at Saltash, four miles up the river. A few months before I went to Plymouth a fire occurred in one of the hemp-houses, called the topping-house; the bell was rung, but the keys were at Saltash, they had therefore to break the door open to get at the fire-gear, but no water could be had."

In reply to inquiries respecting the destructive conflagration in Plymouth dockyard, 1839-40, Mr. Mitchell stated, that "The mains consisted of 8, 6, and 4-inch pipes. * * * The head of water was sufficient to give a supply over any of the buildings or ships in dock, but the pipes had been so neglected, in not having been scoured out, that they had got so full of corrosion and dirt—they not having been cleaned out from the time I left that yard, in 1819, although I had made provision for that purpose—so that from the branches of pipes by the sides of the docks not a drop of water, or at most very little, could be obtained; so that instead of the watchmen being able to screw on to the fire-cocks hose at the first alarm, the fire-bell had to be rung, and the people collected, the engines, &c., got out, whilst the fire was rapidly progressing, so that all endeavour to subdue it was in vain—all that could be done was to protect those parts that had not caught fire. I was informed by a gentleman who was at the taking up of these pipes, that they had been so neglected in not having been scoured out from the time that I had left that yard, that the branches of the pipes by the sides of the docks were full of corrosion and dirt. I very much fear that those at Sheerness are much in the same state, as so far as I can learn, these pipes have never been cleared out since I left that yard; and that the large powerful pumps, worked by two powerful steam-engines of 50 horse-power each, are about to be taken out and done away with, and an engine of only 25 horse-power to be substituted in the place of the two 50 horse-power engines."

A remarkable example of the absence of persons conversant with fire-extinguishing works occurred at Sheerness in September, 1852. On that occasion a fire broke out in the old town, which proved the need of strict discipline in the persons who have charge of such works, and of their presence on the spot. The conflagration broke out near to the dockyard wall, and within a short distance from some of the many fire-cocks in it that were provided in case of fires in the town; but on the occurrence of that event the only persons in whom the fire-extinguishing works were confided lived at the new town, Mile-town as it is called, and it was thought a pity to disturb their night's rest by calling them up, and the fire was left to progress without their aid, or that of the dockyard works; luckily, however, a gazer at the fire happened to be conversant in the use of those works, and, seeing them neglected, hastened into the yard, set the engine to work, applied hose to the fire-cocks in the wall, water was thrown from them upon the flames, so that, as some say, after the fire had been raging for an hour and a half, others only half an hour, as no water could be obtained, but "immediately on the application of the power of the steam-engine, the fire was subdued in a few minutes."

But it is no longer only in Royal dockyards that fire-extinguishing works are rendered unavailing by want of constant use for other purposes. The late disastrous fire at Mr. Scott Russell's premises come in proof of this assertion. Mr. Scott Russell is well known to be eminent in scientific acquirements, and he had provided a large reservoir on the top of his factory, but the means of turning on the water, and its application in case of fire were either unknown to his people or forgotten by them. On the first discovery of the fire it might easily have been subdued by the water in that reservoir; but that resource having been neglected, or forgotten, hand-engines had to be waited for, to the destruction of an immense amount of property. Many private manufacturers, in and near London, have in their factories introduced more or less of the fire-extinguishing works exemplified in Portsmouth yard, and in some public establishments they have been partially adopted, as at the British Museum, under Mr. Braidwood's direction, as I have been told. That gentleman visited Portsmouth yard to acquaint himself with the works in question there. The new Palace at Westminster, it has been said, was *intended* to be fully protected from fire by similar works; but on a late occasion, when some carpenters' stores were on fire within the building, it appeared that the *intended* fire-extinguishing works were still wanting; surely it cannot but be regretted that every possible precaution should not have been early taken for

the preservation of this splendid pile from fire, as from every other destructive accident, and that some means should not be adopted for the insurance of *readiness for use* of any such apparatus as might be decided on.

The above system of combined water and fire-extinguishing works was never intended to entirely supersede the use of hand-engines, for there are some places where they might always be employed with advantage, in long, narrow courts, for example; still less was it purposed to abolish the fire-brigades in the metropolis or other towns. That corps, officers and privates, have always evinced extraordinary skill, courage, zeal, and experience, qualities eminently serviceable on the outbreak of fire, and indispensable where conflagration is extensive.

I now venture to add further means of securing life and property from fire, such as a general introduction of fire-proof structures, as was actually purposed by the same Sir Samuel Bentham as early as the year 1793 or 1794; and practised by him in the Dockyard Record Offices; the storing particularly inflammable substances in *underground* storehouses, so that they might be flooded with water in case of danger, as exemplified by him in the cellars under the reservoir in Portsmouth yard, and proposed extensively for Sheerness, in his plan for that yard January, 1812; the construction of the magazines of navigable vessels in such manner as that they might be filled with water in cases of emergency, and that without damage to the powder. His experimental vessels, the *Dart* and the *Arrow*, had their magazines so arranged in the years 1795-6; and in the *Orinoco*, of late construction, her magazine has been thus secured.

In a paper of mine, inserted in the *Builder* of January 4th, 1847, a plan was suggested for the better security against fire of valuable parchments and papers, such as deeds, foreign securities, &c., &c. The proposal was that property of this nature should be kept in *water-tight* cases, and be in them deposited in an *underground* suitable structure, the upper covering of which to be a cistern of water, and that from that cistern a pipe should issue to convey water into the receptacle below; further, that that pipe should be closed by a plug of *fusible* metal. The effect of such an arrangement would be that, on the event of a neighbouring conflagration of sufficient violence to endanger the contents of the receptacle, the water in the cistern would become heated to 212° Fahr., at which degree of heat the plug would melt, and, consequently, water would immediately flow into the receptacle below, and thus preserve its contents from destruction. I have heard that a similar invention has lately been rewarded by the Society of Arts.

It may not be irrelevant to add, that in the *Mechanics' Magazine*, numbers 1475 and 1504, will be found further suggestions as to the application of fusible metal to fire-extinguishing works, particularly the furnishing such water pipes as those in the Portsmouth wood-mills with water-spreaders, affixing them under that part of the pipe which is of fusible metal, thereby rendering the spread of water self-acting, as well as its influx in case of fire.

The application of fire-extinguishing works to country mansions and farm buildings was proposed in the *Gardeners' Chronicle and Agricultural Gazette* for the year 1853, page 244.

M. S. BENTHAM.

Holly Mount, Hampstead, 23rd May, 1853.

Memorandum with Reference to the Means of Extinguishing Fire in the Dockyards.—There are in the yard two tanks for fresh water over the two wings of the Wood Mills, each containing 170 tons, from which lines of pipes are led through the yard, with proper screw fire-cocks on them at convenient intervals and in effective positions. There is also a large salt water tank, supported on columns, containing 930 tons of water, from which also a line of independent mains is carried through the yard, with double screw fire-cocks at proper intervals and convenient positions. These tanks are supplied with water, each by its own set of pumps, which are each capable of throwing about two tons per minute, and which, if the fires are banked up at night, might be set to work in about twenty minutes after notice was given to replenish the tanks. In addition to the numerous powerful and well-appointed fire engines, at fixed, convenient, and well-known positions in the yard, there are hose-reels, with four lengths of hose screwed together rolled upon them and provided with proper jet-pipes, wrenches, &c., which are easily handled by one man, could be fixed to the fire-cock, the hose run off the reel, and a jet of water at least 35 feet high might be obtained with the least possible delay before engines could be manned and brought by night to the fire. The mains being always fully charged, and the head of water in the tanks being at least 40 feet, these are the readiest means of bringing water to bear immediately on a fire, with force-pumps only, and without tanks or a head of water, as under the most favourable circumstances at night the pumps could scarcely be set to work under twenty minutes, a great deal of valuable time would be lost before a drop of water could be obtained. The nature of the ground in and about Portsmouth-yard (being very level) does not admit of any considerable head of water being obtained, so that a jet of water might be thrown by its own pressure to a greater height than about 35 feet, but that height will command the upper floors of all the buildings in the yard, and is most valuable for the first supply of water before the engines can be got to work. It should be mentioned that the hose attached to the screw fire-plugs has been long in use in the yards, and each night a hose or two is laid from the nearest fire-plugs into each ship in dock or in the basin, to be immediately at hand in case of fire. The arrangement of delivery-hose attached to the fire-cocks, by whoever it was invented or introduced, is a most invaluable one, and Lady Bentham may be assured that her late husband's projects in that respect are carried out in the most advantageous manner practicable.

METHOD OF REPRESENTING OBJECTS BY PRINTING DIRECT FROM THE OBJECTS THEMSELVES.

By Felix Abate, of Naples.

This invention constitutes a new art, by means of which natural and artificial objects can be represented and imitated by printing directly from the objects themselves upon any suitable substance. The specimens submitted to the inspection of the Society at its last meeting, are imitations of veneering wood, some simple, and some ornamented with inlaid work, made upon wood, calico, and paper.

Before entering into the details of this invention, I may perhaps be allowed to state, in order to prevent mistakes, that it is essentially different from the well-known invention under the name of *Phytoglyphy*, or Nature printing, patented in England by Messrs. Bradbury and Evans, and practised at the Imperial Printing Office at Vienna, and which consists in taking impressions in lead or other metals, or gutta-percha, from natural objects, making electro-plates from such impressions, and then printing with these plates in the usual way. The principle of my invention dates from an epoch anterior to the Great Exhibition of 1851, as I exhibited on that occasion the first specimens of a particular application of it, called *Metallography*. For this branch of the art I was rewarded with the Prize Medal. An idea of this art will be obtained from the following notice of the principles and processes upon which it rests:

The art of *Metallography* consists in printing from engraved wood blocks upon *metallic surfaces*, so as to produce imitations of figures and ornaments inlaid in wood. This effect is obtained by using, as a printing menstruum to wet the block with, solutions of such metallic or earthy salts as are decomposed when brought into contact with certain metals, and produce, through an electro-chemical action, an adhesive precipitate of a coloured metallic

oxide, or any other chemical change upon the metal. Such are the salts of copper, antimony, &c., upon zinc, tin, silver, &c.; the hydrosulphuret of ammonia upon copper and brass.

There are two principles at work in this branch of the art — the one is the chemical action just referred to; the other, which is the foundation and the key-stone of the invention, in its most general sense, rests in the porousness of the printing object, which causes the absorption of the wetting fluid, and yields it, under the action of pressure, in quantity for each point, proportionate to the capacity of the pores; so that if any chemical change is wrought upon the impression, to produce a colouring of it, this colouring, by its different shades, makes a true representation of the printing object.

The application of the invention to printing upon vegetable substances instead of metallic surfaces, required the introduction into the process of some new principle to produce that chemical change which, in metallography, is spontaneous. I devised, for that purpose, two principles, which, by different means, lead to the same results. One of these principles I borrowed from the art of dyeing. It consists in the peculiar actions that the salts, acids, and alkalies have upon each other, and upon vegetable colouring matters. It is upon these actions the processes of mordant and discharge printing on textile manufactures rest. The surface of the printing object is slightly wetted with the acting fluid, which is then well wiped off from the surface; the impression is then taken, which, by combining with a previous or a subsequent dyeing of the printed surface, instantaneously appears. The other principle I found in heat, that is, in the colouring action that this most powerful agent of Nature has upon vegetable substances when acted on by acids, which colouring, I believe, is the effect of an accelerated carbonisation of the surfaces of these substances produced by the acid. I think I may properly call this art THERMOGRAPHY, or the art of printing by heat.

From the following description of the process, it will be remarked—perhaps with some degree of surprise—the excessive sensitiveness of vegetable substances under the joint action of acids and heat, so that an infinitesimal dose of the former, and an instantaneous application of the latter, are sufficient to produce the most striking effects. The process is as follows:—

Suppose a sheet of veneering-wood be the object from which impressions are to be taken; I expose the wood for a few minutes to the cold evaporation of hydrochloric or sulphuric acid, or I slightly wet it with either of these acids diluted, and then well wipe the acid off from the surface. Afterwards it is laid upon a piece of calico, or paper, or common wood, and by a stroke of the press an impression is taken, which is, of course, quite invisible, but by exposing this impression, immediately after, to the action of a strong heat, a most perfect and beautiful representation of the printing wood instantaneously appears. In the same way, with the same plate of wood, without any other acid preparation, a number of impressions, about twenty, or more, are taken; then, as the acid begins to be exhausted and the impressions faint, the acidification of the plate must be repeated as above, and so on progressively, as the wood is not in the least injured by the working of the process for any number of impressions. All these impressions show a general wood-like tint, most natural for the light-coloured woods, such as oak, walnut, maple, &c.; but for other woods that have a peculiar colour, such as mahogany, rose-wood, &c., the impression must be taken, if a true imitation be required, on a stuff dyed of the light colour of the wood.

It must be here remarked, that the impressions as above made show an inversion of tints in reference to the original wood, so that the light are dark, and *vice versa*, which however does not interfere with the effect. The reason of it is, that all the varieties of tints which appear in the same wood are the effect of the varying closeness of its fibres in its different parts, so that where the fibres are close the colour is dark, and light where they are loose; but in the above process, as the absorption of the acid is greater in proportion to the looseness of its fibres, the effect must necessarily be the reverse of the above. However, when I wish to produce the true effect of the printing wood, I alter the process as follows:—I wet the surface upon which the impression is to be taken with dilute acid, and then I print with the veneering wood previously wetted with diluted liquid ammonia; it is evident that in this case the alkali neutralising the acid, the effect resulting from the subsequent action of heat will be a true representation of the printing surface.

Such is *Thermography*, or the art of printing by means of heat. Now it is nothing but natural to anticipate in regard to this art, as well as to the other above described processes for printing directly from objects, that they will afford most important services to the natural, botanical, mineralogical, and anatomical sciences; as it is by their means that the internal structure of bodies is unveiled to the eyes of the philosopher, and the wonders of nature in its inexhaustible varieties are indefinitely multiplied, to be subjected to the investigation and to serve the gratification of mankind.

But the new art will prove not less useful to the decorative arts, particularly in its application to produce imitations of rare and costly woods, as well as of works of art, mosaic and inlaid work, applicable for paper hangings, or for furniture in the place of veneering, these imitations being produced at an exceedingly low cost, while they rival in perfection the original objects enabling those whose means are limited to obtain decoration at once cheap and in good taste.

NEW KIND OF GUTTA PERCHA.

Sir Archibald Boyle, Commissioner of the Tenasserim provinces, recently forwarded to Dr. Falconer, the superintendent of the Honourable Company's Botanic Garden at Calcutta, a specimen of a new kind of gutta percha from the province of Mergui. It grows there in considerable abundance, but is much neglected. At the recommendation of that gentleman, the chemical examiner to the government was requested to make a detailed report, as to its physical properties as compared with the true gutta percha. Dr. Falconer himself remarks that, so far as the materials enabled him to judge, they were certainly not derived from "Isonandra Gutta," the species which yields the true gutta percha of the Straits and Malay Archipelago; but they appear to belong to the same natural family, "Sopotaceæ," and the coagulated juice presents many characters in common with the true gutta percha.

Dr. Macnamara, the chemical examiner to government, reports as follows:—

"I have examined the properties of the specimen, and though from want of the proper means I have been unable to make an accurate chemical analysis of it, yet I consider this but of little consequence, for the exact composition of the true gutta percha is not certainly known; and I have found the other properties of this specimen so like those of the commercial gutta percha, that I do not hesitate to express my confident opinion that this new variety will be found to have all the useful qualities of that generally known, and to be equally valuable. The specimen has the sensible properties of gutta percha; the dirty white colour, the greasy look, and the peculiar odour of that substance.

"On placing a piece of it in water it floated. The temperature of the water being raised to 160° Fahrenheit, it became very soft and plastic; and could then be drawn out into thread, or stretched into thin sheets. At the same time the impurities, as pieces of wood, could be readily removed, as the gutta percha did not at all adhere to them. When in this soft state the gutta percha took impressions, as of a key, and retained them firmly when cool.

"It has little or no elasticity. Heated in a tube it boiled, gave off inflammable vapours, and finally left a slight carbonaceous residue. It is very inflammable, burning with a bright yellow flame—giving off a black smoke, and letting fall drops of carbonaceous matter. Rubbed with a piece of warm flannel it became electric. and attracted light bodies. It seems to be a most excellent insulator, quite equal to the commercial gutta percha. A piece of copper-plate was coated with a thin film of it, and placed in a galvanic circuit, with a galvanometer. The needle of the galvanometer was not at all deflected till the gutta percha was excluded from the circuit.

"It is a bad conductor of heat. The specimen was quite insoluble in water, partially soluble in alcohol and ether. Cold ether dissolved about 30 per cent. of it, the portion dissolved being the resinous matters. The matter undissolved by the ether was readily soluble in oil of turpentine and chloroform. On allowing the ethereal solution to evaporate, it deposited many very minute white opaque nodules, which, examined under the microscope, exhibited a crystalline structure. I believe that, as far as is known, these are characteristics of gutta percha.

"A piece of the specimen is readily and entirely dissolved in oil of turpentine and in chloroform. On evaporation the gutta percha was deposited in flexible lamina, exhibiting a porous structure under the microscope. The gutta percha resisted the action of the strongest alkalies. Strong sulphuric acid attracted and charred it, evolving sulphuric acid fumes. Strong nitric acid also attracted it, evolving nitrous acid fumes. Strong hydrochloric acid scarcely affected it. In all these properties the specimen forwarded to me resembled exactly the common gutta percha."

REPORT ON NEW ZEALAND FLAX.

CONTRIBUTED BY WM. CHARLEY, SEYMOUR HILL, BELFAST.

No. II.

Since I furnished my first report on the subject of the *Phormium Tenax*, published in your Journal of the 2nd of December last, I have tried several experiments with the fibre, and instituted further inquiry into its nature and capabilities. I am sorry to say the quality of the fibre does not "improve on acquaintance," and that, for general purposes, it is decidedly inferior in most respects to the common European flax (*Linum usitatissimum*). The advantages it possesses are, 1st, great lineal strength; and, 2ndly, very little decrease in weight under the scutching process, owing to the small amount of useless matter attached in the shape of straw. The defects of the fibre I may also class under two heads, 1st, brittleness when knotted, and of course deficiency in the soft texture called "spinning quality;" and, 2ndly, want of power to resist wet with impunity, and its too easy decomposition under the application of alkalies. The great strength of the fibre in supporting weight under a direct strain (of course in a dry state), has been alluded to by some writer in your Journal; speaking from memory, I think the *Phormium Tenax* ranks about third among the strongest class of known fibres, and, in this respect, namely, lineal strength, it stands I believe before the *Linum usitatissimum*. This almost excessive strength appears naturally enough in union with the harsh and hard nature of the plant; in fact, rather less strength and more pliability would suit better for the purpose of manufacture; so to speak, less of the "fortiter in re," and more of the "suaviter in modo." Its next recommendation, of keeping the weight so well in scutching, is peculiar to the species of *Lilaceæ*, to which it belongs; instead of the fibre surrounding (something like the bark of a tree) a large amount of useless stem, as in our common flax, the New Zealand plant is a mass of fibre on the lower side of the leaf, with a thin green cuticle or covering on the upper side. This green part, when dried and kept for some time, becomes quite yellow, like oaten straw, to which, in chemical composition and affinity, it would appear to be closely allied.

Though the loss of weight in scutching is so trifling, still it is an actual decrease, while the bulk of the fibre, under this process, is materially increased. This would be an argument, as Mr. McAdam states (further on in his sub-report), in favour of importing the plant as a raw material and subjecting it in this country to the scutching as well as any other necessary manufacturing operations.

Having now considered the good qualities of the *Phormium Tenax*, let us look at the other side of the picture. The primary defect, and really a very serious one, is the great brittleness of the fibre when knotted; to overcome this I tried a parcel of leaves, sent me by the Society of Arts, under the ordinary fermenting process used for our common flax, and afterwards the usual exposure to the atmosphere, technically called "grassing." I also tried a second parcel with *partial* fermentation in water as usual, next saturation with soft linseed-oil soap, and then exposure on grass to the weather for about 21 days, on the principle of what was called in old times "dew rotting." I beg to send you with this paper examples of the fibre prepared in both ways (No. 1 and No. 2), and afterwards scutched in a common flax mill. I think the quality of the fibre much improved by both of these experiments; but it is a question whether the expense incurred in carrying them out on a large scale might not be too heavy to be remunerative. I have the pleasure also of sending you samples of strong coarse yarn, and a finer quality made from prepared fibre, No. 1, by Messrs. Mitchell, Brothers, extensive flax spinners in Belfast, who very kindly have taken the trouble of testing its spinning quality. All our endeavours hitherto to soften the fibre for spinning purposes have been only *partially* successful. Messrs. Mitchell submitted the fibre I forwarded to them for experiment to a repeat of the steeping, grassing, &c., that it underwent in my hands, and the result has proved more favourable than they at first anticipated. The coarse yarn looks very well, and would suit nicely for carpet making—a large sample is sent, so that a portion may be given to some of the Kidderminster manufacturers for trial. The following is the report of Messrs. Mitchell:—

"Crumlin Road, Belfast, May 26, 1853.

"We now beg to hand you two samples of yarn spun from the New Zealand flax you sent us, viz., (2 cuts. 51.2 lea yarn, and 11 cuts. 10 lea ditto.) We did not consider it practicable to spin this flax by machinery in the state we received it from you, owing to the fibre being so very brittle, and having no "nature" in it. We submitted it to a steeping process, and found the fibre change considerably, bringing it nearer to the state of flax. We then grassed it, by which process we considered it improved and in a better state for hackling, which it next underwent. At this stage we assorted the fine reeds from the coarse ones, the finest fibres coming off in the shape of "shorts." The yield, we consider, would be much the same as that from strong coarse Irish flax, both as regards line and tow. We succeeded, with some difficulty, in bringing the flax through the various stages of preparing and spinning, and produced the samples of yarn above-mentioned. It is extremely strong, more adapted, we should say, for heavy yarn, suitable for carpet manufacturing or some such purpose. We could not give a correct idea of the value of this article; it would depend whether or not it could be applied to that purpose. We have no doubt, however, that it could be turned (with care) into both good and useful purposes, but it would require considerable attention.

"MITCHELL, BROTHERS."

For the information of those not acquainted with flax scutching machinery, I send herewith a sketch of the ordinary class of mill in use, to which is added the hand scutch and spinning wheel. These drawings were prepared for me by a promising young pupil of the Belfast School of Design, Mr. John McHenry, and are very neatly executed. I also beg to annex a description of McBride's patent scutching machine, by Mr. McAdam, with his account of its suitability for the preparation of New Zealand flax. This information is very interesting, and from Mr. McAdam's known intelligence and respectability, it may

be received as a genuine and candid report. I send an example (No. 3) of the fibre, dressed by this machine roughly for making ropes; No. 4 is Irish flax prepared in the same way. Mr. McAdam states that No. 3 was scutched very rapidly, and if needed for finer manufactures, could be cleaned more completely. I may remark that the flax operated on by Mc Bride's patent machine was the raw material received direct from New Zealand, without any preparation whatsoever:

"Soho Foundry, Belfast, May 1st, 1854.

"Having received from you lately a quantity of New Zealand flax, in the rough or undressed state, for the purpose of ascertaining how far any of our flax scutching machines would be available in cleaning it. we have submitted it to the action of the new patent machine, (Mac Bride's,) and have found the result so satisfactory that we think it unnecessary to look further. We now return you the New Zealand flax dressed in this machine in a very few minutes, and without in any way altering the arrangements which had been made for the dressing of Irish flax. By a simple alteration the machine will carry the dressing of the New Zealand flax still further, should that be considered advisable; but as we believe this fibre is not likely to come into use for any of the finer kinds of manufacture, it is probable that the state in which the machine delivers it at present, (as shown in the sample.) will be found the most remunerative to all concerned. On this point you can inform us hereafter. To show the capabilities of the machine on the fibre for which it is at present arranged, (ordinary flax.) we likewise send you a sample of dressed Irish flax as it comes from the machine. We now beg to offer a few remarks on the advantages to be derived from this mode of dressing New Zealand flax:—

"1.—This machine dresses with ease at the rate of one ton per day of New Zealand flax.

"2.—It is perfectly self-acting; from the time the flax is put into the machine no further attention is necessary.

"3.—No skilled workmen are required. and to do a ton per day, the attendance of only four ordinary labourers, or women, is sufficient.

"From the above, it is evident that the cost of dressing the article will be reduced to a very small amount indeed. Now, with regard to the best mode of employing the machine. New Zealand flax differs from ordinary flax to an extraordinary degree in one particular, namely, it loses very little in weight in the process of cleaning, and it increases in bulk; hence, it will be much more judicious to import the straw or uncleaned fibre, and dress it in this country. The machines can be erected at sea-ports where the New Zealand flax is imported, and thus save all unnecessary carriage. Machines can also be more cheaply erected and maintained in these countries than in New Zealand, and steam power and other appliances more readily obtained.

"We are not aware whether the samples sent to us by you had undergone any process of steeping*, such as is employed for common flax. but we rather think not. It might be well to ascertain, whether steeping in cold or hot water might not render the fibre more easily dressed; if so, the machine would act with still greater advantage. But, here again. it would be a question whether the expense so incurred would be afterwards remunerative. Should you wish us to try any experiments on samples so prepared, we shall do so with pleasure. We have only to remark, in conclusion, that in submitting the New Zealand flax to the action of the machine, we cut it into half the length, this being necessary owing to the dimensions of the machine, which is made for long Irish flax. But, as the fibre even if dressed at its full length would require to be afterwards cut for any manufacturing purpose, we conceive that there would be no advantage gained by enlarging the machine. The machine, with the driving arrangements, costs about £200, and requires 4-horse power.

"MAC ADAM, BROTHERS, & CO."

I also beg to hand you the answer received from Mr. John C. Wilson, in reply to my queries regarding his newly invented scutching machine. On inquiry at Mr. Walker's, I find this machine very well spoken of as a medium between the system of HAND scutching and the ordinary flax mill; it has the advantage of moderate price, the cost being I understand about 20*l.*:—

"Bedford Flax Factory, Thornton-Kirkcaldy, May 9, 1854.

"I am favoured with yours of the 4th current, and, in reply, beg to say that I have tried experiments here with New Zealand flax on my patent scutching machines, and find that they scutch it well, and give very satisfactory results from it, after being prepared.

"I am engaged getting plans of the machine drawn out in a form fit for circulation, one of which I shall forward you in due course. along with instructions and necessary explanations.

"I have one under the charge of the Royal Society for show, with the Messrs. Walker, Tullygiroan, where, I doubt not, you can see it any day.

"JOHN C. WILSON."

I have not been so fortunate as the Mr. Burns mentioned in my last report in procuring a very fine fibre—I think he must have selected some very fine specimens to operate on; indeed there is much difference between the leaves of the *Phormium Tenax* in this respect, some being much coarser and rougher than others, but few of the fine quality like the sample treated by Mr. Burns. So long as the great harshness remains unconquered the New Zealand flax will not be of much service as a substitute for common flax, but it may prove very useful as a substitute for hemp (*cannabis sativa*) in the construction of ropes, twine, and coarse fabrics. I requested Mr. Grattan, of Belfast (chemist), to examine through his microscope the fibre where fractured at the knot, and to give me his opinion as to the cause of brittleness. He states that the fracture appears to resemble the splinter of a thin rod of hard wood, and that it has not the thready, attenuated appearance of broken Irish flax. He did not like to venture a positive opinion as to the cause of brittleness, but, like others, he thinks the *Phormium Tenax* is naturally of a firmer and harder composition than our native plant, and that the fibres are more dense and compact. Under the microscope the fibres look singularly even, in size and regularity of position, stretching from the bottom of the leaf to the top in exceedingly beautiful parallel lines. What a pity it is that such a splendid fibre should possess quite as many glaring defects as it has useful and beneficial characteristics!

With respect to the next deficiency alluded to at the commencement of this Report, Mr. McAdam informs me that the *Phormium Tenax* will not bear *wet* with impunity, and I have reason to believe, from my experience, that this statement is too true. I have read somewhere that the fibre is used in New Zealand not only in ropes, but also in canvas; and perhaps if coated with oil or paint, it might resist the injurious influence of water, and prove a suitable article for marine manufactures.

In my last report I stated, with some hesitation, that the fibre appeared very easily damaged by alkaline solutions. The process of bleaching employed on common linen would not, I think, be safe with New Zealand flax manufactures. This difficulty, however, might, in all probability, soon be overcome by instituting a series of careful experiments. The example of fibre No. 2, owing to the dew rotting, the use of soap as described, and long exposure to the weather, is almost half-bleached, without the strength of the fibre being much, if at all, reduced. The sample No. 5 is nearly bleached white under a very simple process, namely, one immersion in dilute chloride of soda, and afterwards in dilute sulphuric acid, being washed between each immersion with pure water. The solutions used were of the customary strength for linen, yet the fibre appeared much weakened when tested DAMP, but when DRY I was rather surprised to find it regain, in a great measure, its original tenacity. It would seem from this that it is the *dampness* of the bleaching process, quite as much as the actual operation of the chemical compounds employed, that is destructive to the New Zealand flax. One of the chief recommendations of lignine or *pure fibre* is, that it is little acted on by acids or alkalies, unless very concentrated. (See "Solly's Rural Chemistry," page 114.)

It is strange, with all its great tenacity, the *Phormium Tenax* is so easily acted on by such solutions, and that even simple water for the time impairs its strength, only to be restored by slow drying in the open air. In this respect it resembles Jute.

* The sample was NOT steeped or prepared.

Parties interested in the commerce and agriculture of New Zealand, when they read thus far, will say, perhaps, What result have you arrived at? What do you candidly advise us to do? In reply, I would say that I should recommend some house connected by trade with New Zealand to import ten or twenty tons of the simple unprepared plant into Great Britain; then have it scutched by a good machine, in the most economical way for ropemakers to use *in union with hemp*. Now that the Russian supply is likely to be so much interrupted, and the price of that substance so immensely advanced, by the approaching war, I am informed that ropemakers are very anxious for some new material, and the present is, therefore, a very favourable opportunity of introducing the New Zealand flax on trial. Should the speculation I recommend prove remunerative, no further advice will be necessary; if not, the loss cannot, at all events, be very great.

I think the union-rope—half hemp and half New Zealand flax—would be much more durable than one constructed altogether of the latter. Now, as the chief expense in procuring the latter appears to be the freight, —for the plant grows wild in its native soil—I have no doubt it could be imported at half the present cost of hemp, ton for ton; and, in the union-rope referred to, the saving in that case would amount to one-fourth, or 25 per cent. on the cost of material employed. The rope would do capitally for ordinary packing, but I should not recommend it for use in damp situations, without some further experience, though, as I have already said, a coating of oil or paint might, if efficiently applied, guard it from injury even there.*

A portion of the shipment might be fermented and treated like the specimens I send you (Nos. 1 and 2) for making twine, carpet, yarn, bagging, &c., either in *union* with common flax or *alone*, as the manufacturer on trial would find most advantageous.

I should also recommend the New Zealand Society to purchase and import from this country one of Mr. Wilson's Patent Scutching Machines, the cost of which is so small, and the style of which will be a great improvement on the old system of scraping off the refuse matter from the fibre with sharp sea-shells, as the natives have hitherto been accustomed to do. This for a beginning, and when a larger machine is required, one of McBride's Patent, that will clean a ton daily, can be had from Mr. M'Adam, of Belfast. Should the Society wish to introduce, for remote districts, the simple hand-scutch or spinning-wheel, the sketch I send will enable them to have such constructed for trial.

For the satisfaction of those who may not have seen my last paper on New Zealand flax, I beg to repeat here the analysis of the plant, prepared for me by Professor Hodges, Queen's College, Belfast, and Chemist to the Chemico-Agricultural Society of Ulster, annexed to which is given the composition of the Irish flax:—

An Analysis of New Zealand Flax and Irish Flax Straw.

One hundred parts of each contain respectively:—

	New Zealand Flax.	Irish Straw.
Water	60·39	56·64
Organic Matters	37·88	41.97
Ash	1·73	1·39
	100·00	100·00
Ash per cent. in plants dried at 212° Fahrenheit	4·36	3·20

One hundred parts of the dried leaves of the New Zealand flax gave 1·64 parts of nitrogen, while 100 parts of Irish flax straw gave 0·53 of nitrogen. The ash of New Zealand and Irish flax respectively contain:—

	New Zealand Plant.	Irish Plant.
Potash	14·93	20·32
Soda	5·38	2·07
Chloride of Sodium	8·75	9·27
Lime	28·52	19·88
Magnesia	1·41	4·05
Oxide of Iron	1·21	2·83
Sulphuric Acid	4·64	7·13
Phosphoric Acid	18·96	10·24
Carbonic Acid	13·12	10·72
Silica	3·86	12·80
	100·78	99·31

In conclusion, I have to express my obligations to the gentlemen who so kindly assisted me in prosecuting my researches into the nature and qualities of the *Phormium Tenax*, and I am sorry, after all the experiments and inquiries made, I cannot give a more decidedly encouraging report; but I have endeavoured to place before your readers, without prejudice or partiality, the exact truth as to the advantages and defects of this peculiar fibre. If on some future occasion I can be of any use in promoting further investigation or inquiry, the Society of Arts may command my willing services and humble support.

WILLIAM CHARLEY.

May 30th, 1854.

NOTE.—Since I forwarded my report on 30th of May, I have received a letter from Mr. James Lemon, of Belfast, an extensive rope manufacturer, from which I beg to give the following extract:—"I think the sample received is capable of much improvement, and if properly handled and better cleaned, it could be used in rope-making as a *good* substitute for Russian hemp, and, from its superior strength, would I think in time (when it came to be used and tried) be preferred. I have had the small sample spun into rope-yarn and *tarred*, and I find it receives the tar in equal proportions to that of Russian hemp, which is an important thing for the preservation and durability of it in rope."

Mr. Lemon's experience differs from Mr. Aiken's respecting the tar; likely the fibre spoken of by Mr. Aiken was green and not well prepared. That forwarded to Mr. Lemon was the dry flax as imported, after one hasty subjection to the action of McBride's patent. I am glad to find Mr. Lemon's opinion so favourable (though he is unwilling to say decidedly the comparative value with Russian hemp), and this opinion supports me in the recommendations I have given on the subject of making ropes from New Zealand flax. W. C.

June 1st, 1854.

Home Correspondence.

SKIN DISEASES CONSEQUENT UPON THE VARIOUS SUBSTANCES USED BY THE ARTISAN.

SIR,—In your report of Dr. Chambers's able paper on "Industrial Pathology," read with much interest, as I was unfortunately prevented attending the meeting; no mention appears to have been made, either by the author, or by subsequent speakers, of the injury to which the skin is subject, consequent upon the irritant effects of various substances employed by the artisan, to earn, and in the instance of the *baker*, to make, his daily bread. I am the more surprised at this omission, if it be one, as the maladies thus originated, not only are numerous and afflictive, constituting 6 or 7 per cent. of cutaneous diseases, as registered at the Hospital for Diseases of the Skin, but also disable the workman from continuing his avocation, and frequently oblige him to seek other means of obtaining a livelihood.

* I find that it was stated by Mr. Aiken, in a paper "On Vegetable Fibres," read before the Society of Arts, in February, 1842, that "New Zealand flax refuses to unite with tar, and that the recent attempts to supply the place of tar with a composition in which caoutchouc enters, have not been found cheap enough for the purpose."

As an example and verification of this statement, I beg to subjoin a tabular account of cases applying for relief to the before-mentioned hospital, during three of my consecutive attendances at that institution, viz., on May 31st, June the 2nd, and 7th ultimo.

From this table, in consequence of its having been compiled about Whitsuntide holiday-time, and the artizans therefore pleasure seeking, an estimate below, rather than above, the average will be arrived at; the records of the Hospital demonstrating numerous instances where individuals have suffered for years under complaints thus induced, which have relapsed each time the avocation was resumed, so that ultimately, the worn-out patient has been unfitted for any handicraft employment, the irritability of his skin having become so excessive, that a mere ordinary amount of heat, dust, soap, moisture, or even sunshine, to which the affected parts might become exposed, have proved sufficient to reproduce his malady; and thus "the Poor-house," or the vocation of an errand carrier, or such like employment, has remained his only resource to support himself and perchance a family.

Name of Applicant.	Age.	Residence.	Employment.	Employed	Disease Produced.	Duration of Disease.	Parts affected.
Thomas Knight	18	Bermondsey	Grocer	2½ years	Eczema	11 months	Hands and arms.
James Hughes	20	Windsor	Baker and Confectioner	7 years 2 years	Psoriasis	2 years	Entire body, commencing in the hands.
Charles Warner	48	Kennington	Plasterer	20 years	Impetigo and Eczema	10 years on and off	Arms and chest.
Wm. Taylor	19	Chiswell-street	Baker	2 years	Eczema and Lichen	9 months	Both hands and wrists.
John Smith	17	St. John's-lane	Brassfiler	4 years	Eczema	2 years	Hands, arms, and face.
Geo. Mahon	23	Goswell-road	Baker	12 years	Eczema	1½ years	Entire body.
Sarah Froud	42	Carshalton	Washerwoman, using Soda, &c.	12 years	Psoriasis, Eczema, and Impetigo	6 years	Arms, hands, and legs.
Catherine Parsons	30	Clapham	Ditto	7 years	Eczema	5 months	Arms and hands.
Ann Lygon	60	Shadwell	Ditto	20 years	Psoriasis and Eczema	8 years on and off	Hands and arms.
Henry Brigg	45	Poplar	Potboy, from Sugar in the Beer	5 years	Impetigo and Eczema	2½ years	Hands and wrists.
Lucy Richardson	55	Clerkenwell	Washerwoman	8 years	Impetigo and Furunculi	1 month	Hands, arms, and chest.
Wm. Somers	19	Blackfriars	Whitesmith	4 years	Psoriasis palmaris	2 years	Palms of hands.
Wm. Willis	40	Chelsea	Plasterer	24 years	Eczema	1 year	Hands and body.
Stephen O. Kelford	31	Commercial-road	Galvanized ironworkr	1 year	Psoriasis palmaris	1 year	Palms of hands.
Elizabeth Baker	46	Windsor	Glass & China washer at Windsor Castle, using Soda	2 years	Severe Eczema and Impetigo	1 year	Hands, arms, face, and body, commencing in the hands.
Thomas Bradley	25	Holborn	Shoemaker	10 years	Psoriasis palmaris	1½ years	Palms of hands.
Chas. Wiseman	44	Brixton	Bricklayer	20 years	Impetigo, Furunculi, and Anthrax	2 months	Hands, arms, & shoulders
Thomas Dyton	56	Haggerton	Dyer	20 years	Eczema	6 months	Hands and arms.
Wm. Frayer	43	Minories	Dyer	22 years	Impetigo and Eczema	20 years on and off	Hands and arms; but sometimes whole body
Chas. Brooks	23	Camden-town	Grocers' porter, now on railway	6 years	Impetigo	6 years	Hands, arms, and face.
Thomas Nunn	11	Cow-cross	School boy, using soap lees	...	Eczema	1 month	Hands, arms, face, and head.
Richard Juby	21	Blackfriars-road	Bricklayer's labourer	2 years	Lichen	1 year	Entire body.
John Gobley	7	Dorset-street	Used turpentine and palm oil	...	Eczema	2 weeks	Entire body.
Jane Short	22	Houndsditch	Slopmaker with lime-dressed calico	2 years	Psoriasis	1 year	Hands, arms, and body.
Paul Close	40	Chiswell-street	Typefounder	20 years	Impetigo and Furunculi	2 months	Hands.

From the above detail, the following deductions present themselves:—

1st. That various employments and agents give rise to these cutaneous maladies.

2ndly. That their nature is somewhat varied even under apparently similar circumstances, and that no age or sex is exempt.

3rdly. That in several of the substances causing the irritation, no microscopic insect can be supposed to exist, as it is known to do in flour and sugar under the names of "the Meal and Sugar mite," (*Acarus farinæ* and *A. sacchari*,) and, therefore, contrary to what has been assumed by some authorities, that the cause for these maladies must be sought elsewhere.

The explanation of these apparent anomalies in my belief resides chiefly in the peculiarity of constitution or in the predisposition of the patient, modified by his state of health when attacked; thus, to take the example of "Bakers'

Itch," a common cutaneous complaint, produced by the irritation of any farinaceous powder on the skin. By reference to the trade of "Baker" in the table, it is found that the eruption may consist of scaly tetters (*Psoriasis*); of dry raised pimples (*Lichen*); of watery vesicles or tetters, with rawness and redness of the skin, (*Eczema*); of mattery pustules, with much inflammation and swelling (*Impetigo*); of boils and abscesses, which may become carbuncular (*Furunculus* and *Anthrax*); or of various combinations of these maladies, which may be confined to the hands, or implicate the entire body; and it is to be observed that precisely similar effects are produced in similar constitutions, by the irritation of heat and dust, in iron or brass workers, in cooks, in drug-grinders, in workers amongst colours, turpentines, resins, &c.; and even in the manufacture of the quack medicine known as Norton's Camomile Pills; from which irritant, a very severe case has passed under my notice.

The medical treatment of these diseases requires an average of four to five weeks to secure a successful result; during which labour must be suspended, and the management of each case has to be varied according to the constitution of the patient and the manifestations of the disease, to describe which, would lead me to too great a length for this communication.

As preservatives, or prophylactics, I have found the following directions, which for some years have been constantly recommended to my patients afflicted with such maladies, very uniformly successful, except in a few inveterate cases, where the occupation of the individual has been necessarily continued, viz.: to avoid, as much as possible, the use of soap or alkalies to the affected parts, as, by removing or dissolving a portion of the cuticle, they render the vascular layers of the skin more susceptible—to employ as substitutes for soap, soda, &c.; warm gruel, or paste made of arrow-root, rice, starch, bran, or oatmeal, and warm water; and after each ablution to rinse the parts with clear tepid soft water, and then sponge them over with any dilute acid, either vinegar and water, or, what is preferable, a tea-spoonful of "*diluted nitric acid*" to half-a-pint of water; by these means the skin is cleansed, and at the same time becomes hardened, and more capable of resisting irritation.

Finally, I advise the workman to smear his hands with raw mutton or beef-suet, wiping off any superfluities of the fat, so as to fill the pores of the skin before he exposes it to the agent causing his disease; and I desire to impress on those concerned, that this simple expedient alone, when duly practised, has proved most efficacious, if, facile as it is, the artisans can be induced to use it, which, as in the instance cited by Dr. Chambers and the speakers following him, it is to be regretted, is very rarely the case, until they have been taught its importance by repeated attacks of disease and suffering.

I am, Sir, your obedient servant,

JAMES STARTIN.

3, Savile-row.

To Correspondents.

Mr. Jas. S. Tripp writes, "At the adjourned discussion on limited and unlimited liability in partnership, I am reported, in your last number, to have alluded to their having *un*limited liability in the mines of Cornwall." What I did say was, that upon the cost-book principle the liability of Shareholders in the mines of Cornwall was practically limited.

MEETINGS FOR THE ENSUING WEEK.

Mon. Actuaries, 7.—Prof. De Morgan, "On the Demonstration of Formulæ connected with Interest and Annuities." 2. Mr. Henry Tomkins, "Observations upon Sickness and Mortality experienced in Friendly Societies."
Inst. British Architects, 8.—Rev. R. Burgess, "On the Topography and Antiquities of Constantinople."

Tues. Horticultural, 2.
Medical Chirurgical, 8½.
Zoological, 9.

Wed. Royal Botanic, 3¾.—Promenade.
Microscopical, 8.
Royal Society of Literature, 8½.

Fri. Architectural Assoc., 8.—Election of Officers.

Sat. Actuaries, 3.—Anniversary.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 15th June, 1854.

Par. Numb.
220. Wine and Spirit Licenses—Return.
303. Criminal Law—Copies of the Lord Chancellor's Letters, &c.
126. Bills—Registration of Births, &c., (Scotland) (amended).
134. Bills—Convict Prisons (Ireland).
136. Bills—Reformatory Schools (Scotland) (amended).

Delivered on 16th June, 1854.

306. General Committee of Elections—Mr. Speaker's Warrant.
307. Committee of Selection—14th Report.
308. Railway and Canal Bills Committee—8th Report.
137. Bill—Prisoners Removal.
Education—Minutes of the Committee of Council. Vol. 1.

Delivered on 17th and 19th June, 1854.

197. Fees, &c. (Courts of Law)—Returns.
298. Pirates—Return.
300. Irish Poor—Return.
304. Wine and Spirits—Account.
305. Spirits (Ireland)—Return.
295. Exports, Imports, &c.—Accounts.
296. Tallow, &c.—Return.
266. Castledown Delvin and Mullingar Loan Funds—Abstract of Return.
138. Bills—Warwick Assizes.
139. Bills—Vice Admiralty Court (Mauritius).
140. Bills—Portland, &c., Chapels (as amended by the Select Committee).
314. Bills—Railway and Canal Traffic Regulation—Lords Amendments.
Education—Minutes of the Committee of Council, Vol. 2.
Law of Partnership—1st Report of the Commissioners.

Delivered on 20th June, 1854.

249. Cone Telegraph—Correspondence.
258. Accidents in Coal Mines—2d Report.
297. British Museum—Copies of Reports, &c.
141. Bill—New Forest (as amended by the Select Committee).
Canada—Papers relative to the proposed changes in the Legislative Council.
Railways—Return showing the number of Passengers, &c., during the half year ended the 31st December, 1853.

Session, 1853.

939. Titles, Contents, and Indexes.

Delivered on 21st June, 1854.

281. Lunacy—Returns.
313. Hampton Court and Kew Gardens—Return.
315. Navy (Prisoners) of War—Supplementary Estimate.
317. Railway and Canal Bills Committee—Ninth Report.
125. Bills—Merchant Shipping (amended).
117. Bills—Public Libraries (amended).
143. Bills—Poor Law Board Continuance.
144. Bills—Youthful Offenders.
145. Bills.—Union Charges Continuance.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 16th*, 1854.]

Dated 23th March, 1854.

686. M. Poole, Avenue road, Regent's park—Preventing alterations of bank-notes, cheques, &c. (A communication.)

Dated 29th March, 1854.

724. F. W. Harrison and H. G. W. Wagstaff, Pollard's row, Bethnal green—Wicks for candles.

Dated 5th April, 1854.

782. J. Howden, Glasgow—Rivets, &c.

Dated 11th April, 1854.

846. J. Childs, Belmont, Vauxhall—Subjecting fatty matters to pressure.

Dated 2nd May, 1854.

980. W. Hutton, Portland town, St. John's wood—Bricks.

Dated 24th May, 1854.

1158. J. Lillie, Manchester—Looms.

Dated 29th May, 1854.

1183. J. Stevenson, Graslees, near Elsdon—Ploughs.
1185. H. Kraut, Zurich—Cocks, taps, and valves.
1187. C. J. Powriall, Kensington—Communicating from one part of a train to another.

Dated 30th May, 1854.

1191. J. Ridsdale, Minories—Communicating between different parts of ships.
1195. E. Heinhold, Paris—Diurnal and nocturnal indicating apparatus.
1197. M. Scott, Great George street, Westminster—Connecting pipes.
1199. L. Wertheimber, Paris—Preventing sea-sickness.
1201. E. Loysell, Rue de Grétry, Paris—Grinding vegetable substances, and obtaining infusions from tea.

Dated 1st June, 1854.

1212. D. Duncan, Oak Foundry, York—Railway crossings.

1214. J. Arrowsmith, Bilston—Steam-boilers.
1216. W. Westrup, Old Ford—Flour.
1218. S. Schwabe, Manchester—Glauber's salts. (A communication.)
1220. O. Rowland, Lloyd square—Damping paper.

Dated 2nd June, 1854.

1222. T. Greenshields, Derby—Railway chairs.
1220. Earl of Aldborough, Stratford lodge, Wicklow—Locomotion on land and water.
1226. M. Poole, Avenue road, Regent's park—Cop-tubes for mule and other spindles. (A communication.)
1228. J. Taylor, Stratford Rivers—Thin metallic shells for printing.
1230. W. Wilkinson, Nottingham—Stamping and printing patterns upon fabrics.

Dated 3rd June, 1854.

1232. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Umbrellas and parasols. (A communication.)
1234. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Substitute for leather. (A communication.)
1238. J. S. Foretier, Carlton hill—Railway breaks. (A communication.
1240. A. Chavanes, 8, Rupert street, Haymarket—Public carriage indicator. (A communication.)

Dated 5th June, 1854.

1242. J. B. Lindsay, Dundee—Transmitting telegraphic messages through water.
1244. W. Crum and P. Stewart, Thornliebank, N.B.—Finishing woven fabrics.
1246. H. Bordier, Orleans—Alcohol. (A communication.)
1248. E. Marriere, Bedford row—Peat fuel. (A communication.)
1252. S. S. Alison, M.D., Park street, Grosvenor-square—New material for external applications in medicine.

Dated 6th June, 1854.

1254. W. T. Parkes, Aston-Juxta-Birmingham—Gas-fittings.
1256. D. Atkinson, Seaham Harbour—Printing.

WEEKLY LIST OF PATENTS SEALED.

Sealed June 15th, 1854.

2905. Eugène Hippolyte Rascol, of Catherine street, Strand—Improvements in retorts for the manufacture of gas.
2911. Aignan Bernard Callier, of Paris—Improvements in the manufacture of umbrellas and parasols.
2913. Frederick William Branston, of Oak Tree house, Clapham—Improvements in certain tablets, labels, and signs, or their surfaces, exhibiting letters and designs.

Sealed June 16th, 1854.

2788. John Patterson, of Beverley—Improvements in land rollers or clod crushers.
2922. Antoine Limousin, of Paris—Improvements in looms for weaving pile fabrics, and in a mode and apparatus for cutting the pile.
2924. Thomas Williams, of South Castle street, Liverpool—Improved revolving pistol.
2935. Henry Thomson, of Clitheroe—Improvements in machinery or apparatus for stretching textile fabrics as they are wound into laps or rolls after the processes of bleaching and dyeing or operations connected therewith.
2936. Robert William Waitham, of Bentham house, York—Improvements in belts or bands for driving machinery, for use in mines and for other purposes.
2943. Isaac James, of Cheltenham—Improvements in carts for distributing water or liquid manure.
2944. Matthew Parsons Houghton, and Andrew Stewart, both of Hillmorton—Improved means of preventing accidents upon railways.
2945. James Septimus Cockings, of Birmingham—Improvements in buttons and other dress fastening, part of which is also applicable for other purposes.
3018. James White, of East street, Red Lion square—Improvements in friction joints or fastenings.
3030. John Milner, of Stratford—Improvements in connecting the rails of railways.
3045. Stanislas Tranquil Modeste Sorel, of Paris—Improved compositions to be employed as substitutes for caoutchouc, gutta percha, and certain fatty bodies.
24. John Henry Johnson, of 47, Lincoln's Inn Fields—Improvements in ventilating carriages and buildings, part or parts of such improvements being appliaable to the obtainment of motive power. (A communication).
26. Léon Joseph Pomme, of Paris—Improvements in reducing the friction of axles and axle-trees of carriages.
45. Benjamin Burleigh, of the Great Northern Railway, King's cross—Improvements in railway switches and chairs.
80. John Bethell, of 8, Parliament street, Westminister—Improvements in manufacturing coke.
354. William Scaling, of Old Basford, Nottingham—Improvements in machinery for cutting and ornamenting skeins to be used in the manufacture of baskets and other wicker work.
368. John Wren, of Tottenham Court road—Improved construction of folding chair bedsteads.
640. Alexander Hendry, of Port-Glasgow—Improvements in heating bakers' ovens.
670. Alfred Vincent Newton, of 66, Chancery lane—Improvements in japanning leather and other fabrics.
737. Alfred Vincent Newton, of 66, Chancery lane—Improved construction of hone.
742. William Edward Newton, of 66, Chancery lane—Improved manufacture of carpet.
743. Alfred Vincent Newton, of 66, Chancery lane—Improved mode of manufacturing carpets.
765. William Kestell, of Burnham—Improvement in fixing or cementing glass to metal.
775. François Gustave Benoit Capouillet, of Brussels—Improved apparatus for generating heat by the combustion of bituminous or resinous substances.
876. Peter Armand le Comte de Fontaine Moreau, of 4, South street, Finsbury—Improvements in priming fire-arms.
887. Charles Chapel Davis, of Bath—Improvements in portable blow-pipe apparatus.
934. Charles Hart, of the Vale of White Horse Iron Works, Wantage—Improvement in the mode of applying power to combined threshing and dressing machines.

Dated June 20th, 1854.

2954. Adam Paterson, of Westminster—Improved cooking apparatus.
2957. Henriette Elisa Farion de Gergy, Veuve Durut, of Paris—Improvements in the manufacture of bread.
2959. James Boydell, of Gloucester crescent—Improvements in the manufacture of wrought-iron frames.
2964. Archibald Thomson, of Glasgow—Improvements in setting out and marking the rivet holes in the plates used in constructing iron ships, boats, boilers, and other vessels.
2965. R. B. Huygens, of Holland—Improvements in machinery for crushing, washing, and amalgamating gold and other ores and substances.
2966. Gottlieb Boccius, of Hammersmith—Apparatus adapted to the breeding and rearing of fish.
2971. John Jones, of Glasgow—Improvements in propelling vessels.
2978. Benjamin Murgatroyd, of Bradford—Improvements in washing or scouring wool, alpaca, and mohair, and fabrics composed entirely or partly of those materials.
2979. Thomas Berry, of Rochdale, James Mangnall, and John Chadwick, both of Heywood—Improvements in winding and twisting wool, cotton, and other fibrous materials.
2981. Joseph Shaw, of Hatton garden—Improvements in pianofortes.
3039. Julian Bernard, of 15, Regent street—Improvements in stitching and ornamenting various materials, and in machinery and apparatus connected therewith.
49. William Garforth and James Garforth, both of Dukinfield—Improvements in mechanism or apparatus for retarding or stopping the motion of locomotive engines and other railway carriages.
60. Adolphe Drevelle, of Halifax—New combing machine suitable for any textile or fibrous matter.
129. John Norton, of Cork—Improvements in effecting communications between the different parts of railway trains.
133. Francis Parkes, of Sutton Coldfield—Method of fixing tools and implements in helves or handles.
259. Joseph Beattie, of Lawn place, South Lambeth—Improvements in furnaces and in the treatment of steam.
594. James Jones Aston, of the Middle Temple—Improvements in the construction of envelopes.
731. John Sandys, of the Electric Telegraph Works, 72, Upper White Cross street, St. Luke's—Improvements in electric telegraph instruments.
750. Alfred Vincent Newton, of 66, Chancery lane—Improvements in sewing machinery.
772. Robert Brisco, of Low Mill House, St. Bees, Cumberland, and Peter Swires Horsman, St. John's Beckermet, in the same county—Improvements in heckling machinery.
780. George Ross, of Falcon square—Improved mode of preventing the alteration of bank bills from one denomination to another.
849. John Johnson Peile, of Whitehaven—Improved construction of lifting jack.
905. Richard Archibald Brooman, of 166, Fleet street—Improvements in separating substances of different specific gravities, and in machinery employed therein.
938. James Coombe, of Belfast—Improvements in machinery for hackling flax and other fibrous substances.
940. Thomas Weatherburn Dodds, of the Holmes Engine and Railway Works, Rotherham—Improvements in furnaces and fireplaces, for effecting a more perfect combustion of fuel, and prevention of smoke.
941. Jonathan Davidson, of Edinburgh—Improvements in breakwaters.
962. Andrew White Gibson, of Edinburgh—Improvements in mills for the manufacture of barley and rice.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
June 19.	3602	Postage Label Damper	Thomas John and Joseph Smith	Queen-street, Cheapside.

Journal of the Society of Arts.

FRIDAY, JUNE 30, 1854.

THE CONFERENCE.

The Council propose that the following subjects shall be discussed at the Conference which is to be held at 11 o'clock on Tuesday next, the 4th of July:—

I. The Bill now before Parliament for affording facilities for the conveyance of sites for, and the better government of, Literary and Scientific Institutions.

II. The Proposed System, printed in No. 72 of the *Journal of the Society of Arts*, of Examining and Granting Certificates to the Students of classes of Institutions in Union with the Society.

III. The Granting of the Parliamentary Papers to the Institutions.

IV. The Publication of a Revised List of Lecturers.

Other subjects will be brought forward by individual Representatives.

MEETING OF COUNCIL.

WEDNESDAY, JUNE 28, 1854.

The following Institution has been taken into union since the last announcement:—

363. Dedham, Literary Institution.

EDUCATIONAL EXHIBITION.

In the Journal of May 26 were inserted some memoranda respecting the public schools at the Hague, made by Mr. Winkworth, during his recent visit to that city. He has since furnished the following notices of other educational establishments in Holland and Belgium;

Rotterdam, May 22, visited—

I. The School for the Children of Poor Jews, at which I observed nothing worthy of special notice, unless it may be the dirty and imperfectly-ventilated condition of the rooms, and from which I was glad to retreat after a brief inspection.

II. The Armhuis. This establishment does not differ materially, in the economy of its management and instruction, from the one at the Hague. There are about 300 children, who enter at the early age of 2 years, and are not lost sight of even after their education is completed. I was present at their dinner-hour, and observed many young men, in the homely costume of the establishment, partaking of that meal, who, though employed in the town, are boarded and lodged in the house until 21 years of age, unless previously able to support themselves. The girls are taught knitting, needle work, cooking, &c., to qualify them for domestic service.

III. The Stad School, to which children are admitted at 6 years of age, and remain until they are 12 or 13. There are about 900 of both sexes and 20 masters. Here, also, the mode of teaching and the things taught are essentially the same as at the Town School of the Hague.

Antwerp, May 24.

As I was only here for a few hours, my visit was confined to L'Ecole Industrielle, or rather that portion of it over which Mons. Corr, to whom I had an introduction, presides, viz.,—that where engraving is taught. Here were several pupils engaged in transferring to a copper surface pictures which they had themselves copied in Indian ink, on a reduced scale from the originals, both of ancient and modern masters. The introduction of this art into Belgium, as an important branch of industrial education, is due to Mons. Corr, who is himself an engraver of great eminence. At this moment he is engraving from an exquisite miniature drawing, taken by himself, from Rubens's celebrated picture of "The Descent from the Cross." He has already been occupied on it more than two years, and he expects that it will not take him less than four years more to finish. He showed me various impressions taken in different stages of progress, and if, as an unprofessional man, I might venture to give an opinion, it would be that, when completed, it will be one of the most exquisite specimens of line engraving which has ever been produced. I am confirmed in this by the fact that one of our most enterprising print-sellers has already offered him a very large sum for it; but Mons. Corr declines to part with it by anticipation, as he is more anxious for his reputation than for any pecuniary reward, however tempting. All this, however, by way of parenthesis, being rather beside the object of my visit to his department. I learned from him that the young men receiving industrial education at that establishment are generally engaged during the day at their several trades in the town, the hours of attendance being only from 6 to 8 in the morning during the summer months, and from 6 to 8 in the evening of the winter months. Schools of art, as an essential branch of industrial education, are of comparatively recent introduction, but the appointment of accomplished professors, like Mons. Corr, is evidence of the importance attached to it by the government of Belgium.

Brussels, May 27.

The Bourgomestre having, at an interview with him the previous day, proposed to send his private secretary with me to the principal schools connected with or supported by the government and the corporation, I gladly availed myself of his kind offer. Accordingly, at nine o'clock this morning, M. Leon Moreau presented himself for that purpose, and certainly I could not have had a more suitable ciceroni than I found him to be. We visited

I. L'Ecole Moyenne Inférieure, at which were about 600 boys, from 6 to 14 or 15 years of age, who, besides being taught reading, writing, and arithmetic, receive lessons in chemistry, geography, astronomy, drawing, and the sciences generally, or so far as practicable, during the 8 or 9 years they attend there. Here, as elsewhere, children are rather allured than compelled to learn. The walls are decorated with pictures more or less calculated to attract the eye, but all having some bearing upon subjects with which it is important that the pupils should be acquainted. As I have reason to expect that the whole series will be sent to our Educational Exhibition, I need only mention that they are tecnically known as the "Musée Populaire de Belgique," and "Tableaux des Signes de Ponctuation et Orthographiques." They have also a "machine à syllaber," similar to the one already described, and of which a specimen will be sent to the Society, and large maps, with or without letters, as may be required, in the several stages of geographical progress. The charge made for all this valuable instruction is merely nominal, being only 5 francs per month, and even this is remitted where the circumstances of the parents are too confined to afford it.

II. L'Ecole Communale. At this establishment there are 300 girls and 500 boys, whose course of instruction is similar to the foregoing. I observed that the slates were let into the lids of the desks, so as to be immoveable, and that they use a similar counting machine to the one of which I directed a fac-simile to be made for the Society at the Hague. In one of the rooms I noticed a sort of museum of miscellaneous objects under glass cases, consisting of teas, minerals, grain, as wheat, rice, barley, &c.;

sugars, woods, insects, &c., &c., all which the master said had been contributed by the children themselves, who were encouraged to take an interest in the productions of nature.

III. L'Ecole Gardienne. Here they receive about 400 children from 2 to 7 years of age, the parents or friends of whom pay 10 cents each per week if able. As with us in England, cleanliness, order, and obedience are the first things taught, and I am bound to say that this instruction is not nominal but actual, as the appearance and behaviour of the children afforded ample testimony to the pains taken with them. The principal room was hung with pictures descriptive of trades, natural history, &c., as in other schools in Brussels, and about which the children are encouraged to ask questions.

IV. L'Institut des Sourds et Muets, et des Aveugles, of whom there are 36 (boys only) in the establishment. I first inspected the department of the deaf and dumb, in company with the master, who is a catholic priest. He began by writing on a large board, and in a bold hand, questions in geography and arithmetic. As at other schools, only silently and by signs he appealed to the class to know who could answer them. The first question was in compliment, I presume, to me, "What town or city is the capital of England?" Immediately nearly all hands were held up, and the owner of one of them was signalled to take his place at the board and to write the answer, which was of course "the city of London." This he was required to pronounce, and did so, as he did also the answers to various other questions relating to our metropolis, but it was evidently rather a painful effort, and the sounds emitted were anything but pleasant to the ear. Questions in arithmetic, some of them complicated, were then asked and worked on the board, but, though the true rules were always adopted, the correct results were not invariably obtained at the first attempt. Altogether the readiness and proficiency of the children bore mute testimony to the intelligence and patience of the master, who evidently ruled rather by moral suasion than rigid discipline.

I then went to the department appropriated to the instruction of the blind, which is also undertaken by a pains-taking priest. The examination began by a boy reading from a book of history in raised type, which was opened indifferently at various pages, and from which he read with the greatest ease, seldom hesitating, and never making a mistake—certainly none which I could detect. I am obliged to make this qualification, as the type being expressed only by raised spots I could not follow him. The system was explained to me, and one of the boys stamped several sentences, which another boy afterwards read: but as I expect that the apparatus, accompanied by the necessary explanations, will be sent to our Exhibition, it is not necessary that I should say more than that the principle is simple and effective. I was then shewn in practice the system for writing, which like that for reading is somewhat mechanical. Sentences, such as "*Londres est le capitale de l'Angleterre*," &c., were written intelligibly, if not very elegantly. To these exercises succeeded questions in geography, which were resolved from rather rude maps, the divisions being made by worsted threads sewn on the maps, and the towns indicated by small beads, also sewn on, of different sizes, according to their relative importance. I asked the situations of several places, as Stockholm, Dublin, St. Petersburg, Paris, and London, and the fingers of the poor children were on the right beads without a moment's hesitation. Questions also as to the number of inhabitants, history, form of government, &c., were also answered with more or less readiness, and all apparently with pleasure. My ears were then regaled with a little music, and if I could have spared the time I should have been honoured with more elaborate specimens, both vocal and instrumental. It only remains for me to say, that in the dormitories, the living rooms, and in the play-grounds, the utmost cleanliness and order prevailed. In the latter, both the deaf and dumb and the blind take exercise together, but I could easily detect at a distance the precise nature of their deprivation, the blind walking arm in arm in cheerful converse together, while the deaf and dumb ran about separately, but carefully avoiding to interrupt their blind companions. It was certainly a most interesting though somewhat painful spectacle.

Malines, Sunday, May 28th.

In company with Mons. Corr van der Maeren, of Brussels, I this day visited the justly-celebrated Jesuit establishment of this town, but as it is nominally self supporting, and is appropriated to the instruction of the children of parents in the middle and higher walks of society, it does not come within the category of the schools it was desirable I should inspect. I shall, therefore, only say of it that we were received with great urbanity by Mons. Tellier, "inspecteur ecclésiastique de l'enseignement primaire pour le Brabant," that the rooms were large, handsome, and lofty, the dormitories well furnished and clean, the eating rooms and food such as we should expect to find in respectable society, the playground and gardens extensive, and the chapel architecturally correct and handsome. I observed that in nearly all the class-rooms large maps were let into or traced on the walls, with or without letters, which Mons. Tellier said they thought a desirable mode of silently teaching geography, for while unemployed the eye would naturally wander, and what so likely to obtain attention as maps or suggestive pictures. The children at this branch of the establishment are received from 8 to 14 years of age, pay about £12 per annum, and are taught everything but Latin and Greek. If intended for the learned professions, they are transferred to another branch in the town; for it is a rule of the establishment not to allow children under 14 to be diverted from more important studies, by attention to others which they may never have occasion for in after-life. For the children of Catholic parents, it cannot be doubted that this is an economical school, where they are well and intelligently taught, and where both health and morals are carefully attended to.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £901, including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

SEVENTH LIST.

	£	s.	d.
Sir Thomas Dyke Acland, Bart.	3	3	0
Thomas Dyke Acland . .	2	2	0
T. Horlock Bastard . .	2	0	0
Decimus Burton, F.R.S. .	1	1	0
George Combe . . .	3	3	0
Rev. F. C. Cook . . .	5	0	0
Dr. Cornwell . . .	2	2	0
Rev. W. David . . .	1	1	0
Joseph Earle . . .	2	2	0
Rev. J. G. C. Fussell . .	5	0	0
M. Hanhart . . .	1	1	0
W. Hammond . . .	1	1	0
J. Harrison . . .	2	2	0
John Hawkshaw . . .	5	0	0
Rev. Dr. Hessey . . .	2	2	0
T. Hicks	2	0	0

	£	s.	d.
Dr. H. Bence Jones, F.R.S.	2	2	0
Richard Lambert Jones	1	1	0
G. T. Kemp	2	2	0
Dr. R. G. Latham	3	3	0
Capt. J. M. Laws, R.N.	1	5	0
Moses Levy	3	3	0
W. G. Lumley	1	1	0
Rev. H. Mackenzie	3	3	0
Herbert Minton	5	0	0
D. Oldfield	1	1	0
James Panton	1	0	0
W. H. Pepys	2	2	0
Dr. Playfair, C.B.	3	0	0
W. Rideout	1	1	0
Joshua Ruddock	2	2	0
E. Ruff	1	1	0
R. H. Sandford	1	1	0
Samuel Saynor	1	1	0
C. H. Smith	1	1	0
Rev. W. Strong	1	1	0
Dr. Veitch	1	1	0
S. W. Waley	1	1	0
H. Bellamy Webb	2	2	0

AGRICULTURAL AND INDUSTRIAL RESOURCES OF ALGERIA.

Marshal Vaillant, Minister of War, has recently delivered to the Emperor of the French a careful report on the civil, military, commercial, industrial, and agricultural position of Algeria in 1853. The report goes to show, by evidence, that the colony has already emerged from its experimental state, and that every day new resources are revealed, materially increasing its productive powers; that the hopes and anxious cares of the Government have met with a hearty response from every one in the colony; and that, after many doubts and fears and anxious trials, success is now attained. The following are extracts from some parts of the reports which may be considered as more particularly coming within the range of this Journal.

Fertility.—In 1853 this colony supplied France with more than 1 million hectolitres of grain, valued at 14 million francs. The soft wheat produced was of a quality such as never had been grown in France, weighing from 86 to 88 kilogrammes the hectolitre,* in the place of 75 and 76. The rye was of a grain so firm in appearance and so plump that it might readily be mistaken for the second qualities of wheat. In some instances single grains of wheat have produced as many as 150 ears, and single grains of barley as many as 342 ears.

Tobacco Culture.—In 1853 the number of hectares in cultivation had risen to 2,277. Independently of local consumption, and the quantity retained in the hands of the colonists, the sale of 1,800,000 kilogrammes is established by official records, out of which the Government purchased 1,427,276 kilogrammes, at a price of 1,303,000 francs. The average price per 100 kilogrammes was 91f. 30c. The tobacco of Algeria already leaves that of Egypt, Macedonia, and Greece far behind. The tobacco of Hungary is not of so agreeable a flavour; that of Kentucky is not finer, nor does it more readily burn, whilst the tobacco of Maryland is deficient in elasticity, and possesses a bitterness in flavour which cannot be charged upon the Algerian. They may be classed, therefore, above the tobaccos which, though not of the first qualities, nevertheless have high reputation.

Silk Culture.—The superior quality of the Algerian silks was confirmed by the award of two medals at the Great Exhibition of 1851 in London, and by the prices they have secured in the market of Lyons. There is no longer a doubt that Algeria will take a distinguished position among those countries which are indebted for their wealth to the cultivation of silk. In 1853, 335 individuals produced in the single department of Algiers 14,000 kilogrammes of cocoons. The new plantations of mulberry trees which are daily rising in the three provinces, bear sufficient witness to the desire of the colonists to afford this business all the development of which it is susceptible.

Cultivation of Madder.—The superiority of the madders—the produce of Algeria—over those of Cyprus, hitherto the most esteemed, is proved by a number of authentic reports. It appears from the calculations of many colonists that it can be produced at a price of 70f. per 100 kilogrammes, whilst the prices current of the Rouen market show that madders sell at from 140 to 155 francs per kilogramme; giving a profit to the colonist of cent. per cent.

Breeding the Cochineal Insect.—The possibility of this being done is no longer doubtful. The successful results of former years have determined many colonists to apply themselves energetically to the work. Some have embarked the whole of their fortunes in the cultivation of the nopal or cactus, on which the insect feeds. One hectare planted with 13,000 plants, gives a gross produce of from 10,000 to 12,000 francs, 2,000 of which only are required to meet the expenses. It is reckoned there are actually 29 of these cactus farms (*nopaleries*), with 500,000 plants.

Cultivation of Cotton.—England, whose judgment on this subject cannot be doubted, gave at the Great Exhibition of 1851, eleven rewards to samples of cotton from Algeria, and at the present time the cultivation of cotton has become a staple of the country. The two varieties which succeed best are those which command the highest prices, because America can only produce 30,000 bales. Europeans and Arabs have set themselves to the work, and in one year, in the department of Algiers alone, the breadth of land under cotton cultivation has increased tenfold. The colonists are deeply grateful to the Emperor for having founded for the next ten years an annual prize of 20,000 francs, to be awarded to the planter who shall produce on the largest scale the finest cotton.

Oil Trade.—The olive, in Algeria, attains to the size of a forest tree. Certain districts, and particularly Kabylie, are covered with it. Since 1852, the oil trade has made rapid strides. The inhabitants of Kabylie have taken to the markets of Bougie, Dellis, and Djidjelly, large quantities of oil, which have been immediately purchased by French merchants. Establishments, under good European management, have been formed in the very mountains themselves, where natives are taught, in nursery-grounds, the art of engrafting the olive. In 1853, though the production was below the average, the export reached 2,914,450 kilogrammes.

Government Nursery Gardens.—These establishments are formed for the purpose of raising large numbers of young trees and selling them to the colonists at the lowest possible prices, and for experimenting on the cultivation of different foreign plants used in the arts, with the view of ascertaining if they can be acclimatized in Algeria. To the central nursery-garden the colonists are indebted for the cultivation of cotton and madder, the breeding of the cochineal and the silk culture. The acclimatization of the coffee and tea plants has also been tried there, and not without some degree of success. The Oases are indebted to these gardens for the attempts by Biscara to cultivate the rice of China, which grows at the foot of the palm tree without any special care.

The cultivation of other things gives promise of good results, such as flax, sesamum, arrowroot, &c.

* The hectolitre contains 22·096 gallons, or 2 9-10ths hectolitres make one quarter English. A kilogramme is 2 lbs. 3oz. English. The hectare contains about two and a half imperial acres. The metre contains about 3 feet 3 inches English. One hundred francs may be reckoned as £4 sterling.

FOREST TREES.—The forests of Algeria at present known, cover about 1,200,000 hectares, and are composed to a very great extent of cork trees. Already 12,000 hectares of this tree, all the more valuable as it is beginning to fail in other places, are worked by Companies to whom the right has been ceded. On the line of the Tell, forests of cedars are met with, some of which measure in girth four or five metres. A naval engineer has lately noted the existence of very fine timber trees fit for every description of purpose in ship-building. France will, then, soon go to Algeria to stock her ship-building yards with the best of timbers. Other woods, doubtless, will be found useful in the manufacture of furniture, such, for example, as the turpentine tree, the juniper, the olive, &c., which are in no respect inferior to those of America.

MINING AND MINERAL INDUSTRY.—The copper mines at Mouzaia and Tenez have been stimulated in their workings by means of temporary licenses to export to foreign countries. The important establishment at Caisuh has commenced its works. The mine of argentiferous lead at Kef-oum-Theboul continues to be profitable to its proprietors. It has exported 3,111,516 kilogrammes of ore. The iron mines and works of Allélik, whose products rival those of Sweden, have taken a start which insures the prosperity not only of the company, but of the whole district. Numerous licenses to explore have been granted in 1853, for veins of copper and silver lead in Morue Bonsaseah and in the valley of Oued-Acdés; of lead near Setif, and in the valley of Bou-Merzouq; of lead and copper in Mount Fifila and Sidi-Reghis; of lead and silver lead near Laka-Marghnia and Rouban.

The white marble of Mount Fifila yields in no respect to the finest white Italian marble. The working of these quarries has begun, and everything leads to the belief that their produce will be adapted to the sculptor's use. A quarry of the finest transparent onyx, bearing traces of having been worked by the Romans, has been discovered near Tlemcen. This substance is as beautiful as cornelian and chalcedony, and fetches a price of from 1500 to 5000 francs the cubic metre.

CORAL FISHERY.—One hundred and fifty-six coral boats explored in 1853 the coasts of Bonne and Calle, and obtained, on an average, 230 kilo. per boat, making a total of 34,880 kilos. At the price of 60 fr. per kilo., the value of the fishery would be 2,152,880 fr. On the coast of the Province of Oran, considerable banks have lately been found, and 150 Spanish vessels have come after the rich prize.

TRADE IN WOOL AND RAW HIDES.—One of the most considerable enriching trades in Algeria is the wool trade. The exportation in 1853 rose to 4,354,490 kilogrammes. During the same year there were exported raw hides to the value of 2,059,847 francs.

PERMANENT EXHIBITION IN THE RUE BOURGOYNE.—When the researches made in Algeria are both known and understood in France, they will attract into the colony more hands and more capital. With the view of giving the public the opportunity of verifying what has been done, the Government has formed an Exhibition of Algerian produce, open to all. Small as it is, the collection is of the highest interest. The cotton, the silks, the madders, the tobacco, the cochineal, the woods, the metals, the oils, of Algeria are there shown in a highly satisfactory way. Side by side with the raw produce is the manufactured article. Near the raw cottons are placed the same cottons spun and converted into cloth, from the coarsest to the finest. In addition, the eye may follow a series of experiments made in various other branches of agriculture or business. Many manufacturers have testified their high admiration for Algerian products, and this admiration has more than once led to the formation of trading companies.

PARIS UNIVERSAL EXHIBITION OF 1855.

At a Special Meeting of the Council of the Institution of Civil Engineers, held June 20th, 1854, the following Resolution was unanimously agreed to:—

The Lords of the Committee of Privy Council for Trade having requested the assistance of the Institution of Civil Engineers in obtaining an adequate representation of the principal works of Civil Engineering, and of machinery, of the United Kingdom, to be transmitted to the French Universal Exhibition of 1855—

The Council of the Institution considers,—

That, having regard to the estimation in which the Civil Engineering constructions, and the machinery produced in the United Kingdom, is held throughout the world, and to the highly favourable opportunity presented by the Universal Exhibition of 1855 for maintaining and extending such reputation, it is the duty of the Council to impress on the Members of the Institution of Civil Engineers and the producers of machinery throughout the United Kingdom, the importance of accepting cordially the invitation of the French nation to exhibit in Paris, 1855, and of using their utmost exertions to cause machinery, in all its departments, to be completely represented on that occasion, and the Council are happy to co-operate earnestly with the Department of Science and Art of the Board of Trade, in promoting this very desirable object.

That a copy of this Resolution be communicated to the Members of the Institution, and others whom it may concern, with a recommendation that manufacturers desirous of exhibiting should transmit their demands for space as soon as possible to Marlborough House, in accordance with the printed instructions, in order that the Officers of the Department of Science and Art of the Board of Trade, in concert with the Institution of Civil Engineers, may be enabled to judge how far the representation of Machinery is likely to be complete, and that the Council may be enabled to take measures accordingly.

By order of the Council,

CHARLES MANBY, *Secretary.*

LOCAL MUSEUMS OF ART.

The following minute, on aiding the formation of Local Museums of Art, has been recently issued by the Board of Trade:

The Lords of the Committee of Council for Trade are desirous that local Schools of Art should derive all possible advantages from the Central Museum of Ornamental Art, and are prepared to afford assistance in enabling them to do so. Their lordships are of opinion that if articles belonging to the Central Museum were circulated among the Schools of Art, and publicly exhibited, the instruction given in the schools would be aided, the formation of Local Museums encouraged, the funds of the Local Schools assisted, and the public knowledge of taste generally improved.

With these views my Lords have directed that collections should be made of articles from each of the divisions of the Central Museum, namely,—glass, lace, metals, ivory carvings, &c., pottery, paper-hangings, and woven fabrics,—and that they should be sent in rotation to local schools making due application and expressing their willingness to conform to the following conditions:

1. That adequate provision be made by the committees of the local schools for exhibiting—during a limited period—the collections to the students and the public, both in the day time and the evening.

2. That the committee of the school endeavour to add to the exhibition by obtaining loans of specimens from the collections of private individuals in the neighbourhood.

3. That the students of the schools be admitted free; but that all other persons, not students, pay a moderate fee for admission, which should be higher in the morning than the evening. To enable artizans and others em-

ployed in the day time to share in the benefits to be derived from the collection, the fee on three evenings in the week should not exceed one penny each person

4. That any funds so raised should be applied—1st, to the payment of the transport of the collection to the school and other expenses of the Exhibition;—and, 2nd, that the balance be appropriated in the following proportions, namely:—One quarter to the masters' fee-fund; one-half to the purchase of examples for a permanent museum, etc.; and one quarter to the general fund of the school. Committees of schools desiring to receive the collections are requested to make application in the accompanying form.

(Signed)
HENRY COLE,
LYON PLAYFAIR.

Marlborough House, 21st June, 1854.

THE CULTIVATION AND MANUFACTURE OF OILS.

By William Brotherton.

Having endeavoured for some years to impress upon the agricultural interest the importance of cultivating the rape plant for the value of its oil, and also having had the honour of bringing the subject before the Royal Agricultural Society of England in July last year, the Council of which Society was highly favourable to the idea, considerable attention has been directed to the cultivation of oils; but it will be a work of time to obtain the knowledge necessary to make the growth of oils very productive to the British farmer, or materially benefit the consumer, without the aid and encouragement of the landed interest on the one hand, and the manufacturer and large consumer on the other. The best known principles of cultivation must be collected and disseminated; and the superior properties brought out by the additional science displayed in their production must be thoroughly appreciated. From these considerations, coupled with the political changes taking place between this and other countries from which we have hitherto drawn our principal supplies of oil and oil seeds, also the vast annual increase in their consumption (the quantity imported in 1853, exceeding in value upwards of thirteen millions sterling), and the important uses to which they are applied, oil cultivation may be considered, when viewed in all its bearings, as one of national importance.

To make this subject better understood, I beg to offer a few remarks relative to oils, with a view of creating a greater interest in their production and in the science of their application. My information has been obtained from long practical experience, and from observations made in some of those countries most famed for the production and manufacture of oils. My remarks will have reference chiefly to the fixed oils, and more particularly to those capable of home production, viz., the rape and the flax, plants indigenous to our soil and climate. The nature and properties of oils are but very indifferently understood. The circumstance that England (unlike other countries) imports all the oil she consumes, has caused this article to be one of great speculation, both at home and abroad, and has prevented science being brought to bear either upon its production or manufacture.

From the earliest period oils have been an essential necessity in the economy of life, and such was the perfection to which the Egyptians brought the manufacture of flax oil, that we have examples of their paintings in a perfect state after the lapse of more than two thousand years. Flax oil possesses an extraordinary affinity for oxygen, and in combination with that gas rapidly becomes dry, forming a hard, enduring substance. Olive oil, on the other hand, when in its pure state, possesses no affinity whatever for that gas, and, if exposed in thin layers on the surface of metallic bodies, it will retain its limpidity for years. These are the marked characteristics of the two oils, and all others possess one or other of these properties, but in a modified state, We find our great Creator, in his instruction to Moses for the erection of the Tabernacle, after directing the form and manner of the lamps, tells him, (in Leviticus, xxi. 2,) "Command the children of Israel, that they bring unto thee pure oil olive beaten for the light, to cause the lamps to burn continually." Olive oil also formed the principal portion of the holy anointing oil, with which all the vessels of gold &c., were anointed; this was doubtless done to preserve the polished surfaces of the metallic bodies from becoming oxydised or tarnished. Subsequently God informs Moses that he had inspired the minds of men to produce all those works which he had commanded to be done; therefore, as all the works of God are perfect, we may safely conclude that here was the perfection of artificial light, and the preservation by lubrication of metallic surfaces from the action of the gases of the atmosphere.

The Greeks and Romans were celebrated for the production and use of oils, particularly the flax and the rape; in the latter nearly every valuable property contained in the olive was found. These oils were employed by them for food, for anointing or lubricating, and for burning in lamps. The Romans as well as the Greeks were extensive manufacturers of lamps, especially those in terra-cotta, which they exported to all parts of the then civilized world. They also employed oil as a means of obtaining artificial heat, and they likewise used it for heating baths for domestic and other purposes, on the same principle that we now employ coal gas. It is evident that they had great difficulty in keeping their olive oil from becoming rancid; and thus rape eventually became more valuable, as its oil could be kept perfectly sweet in the seed, and could be drawn at pleasure, independent of the meal of the seed, which also had its value.

It is probable that the Romans introduced the rape seed with their lamps, into Britain and other countries. But, however that may be, the rape and flax have flourished in most parts of Europe for many centuries, during which they have supplied artificial light and served other necessary purposes. About the middle of the past century a great impetus was given to the demand for rape oil, on the introduction of woollen and other manufactures into Britain. Then the steam-engine as a new motive power vastly increased its consumption; and at the close of the century the cultivation of rape and flax had become so extensive that the landholders and others took alarm, under the erroneous impression that oil growing would so impoverish the soil as to cause wheat and other grain to be thrown out of cultivation and thus produce famine. This idea became so general, and the popular feeling ran so high against the introduction of machinery, that every means were adopted to prevent the growth of oil. These discouragements and other obstacles placed in the way soon put a stop to its progress, and at the commencement of the present century it had nearly ceased to be grown. The high price of oils at this period gave a great impetus to the whale fishery, and the introduction of coal-gas materially relieved the pressure on the market. The railway system and the development of marine steam-power has produced such an immense demand, that all the various oils and oil-seeds we have been able to import from all parts of the world have not been equal to the demand. Our whale fisheries have long since ceased to be productive, and the greater part of the fish oils now consumed are imported from America, and are of an inferior quality to those formerly supplied by British enterprise. The supply of olive oils is very precarious, and, from the want of science and ordinary care in their manufacture, they have been imported for some years past in a most rancid, decomposed state, injurious to the health of those who use them. The importation of rape and flax seed during the past year (1853), was 1,122,150 quarters; the first four months of the present year, 140,900 quarters, from Russia, Prussia, Italy, Egypt, India, &c.; but the whole of these seeds are of a very inferior quality, and are much mixed with other seeds of different and opposite

properties, frequently to the extent of one-third of their bulk. From an official report relative to the flax seeds imported in the past year, the following is quoted:—"The quality of the seed has been very various. 60,000 quarters from Archangel, the worst seen for several years; from Riga 90,000 quarters for crushing, and 35,000 quarters for sowing, also the worst seen for several years, much mixed and very indifferent; St. Petersburg, 190,000 quarters, some of the better sorts satisfactory, but the others equally otherwise; from the Black Sea and Sea of Azof, 530,000 quarters; some of the Black Sea cargoes (especially the early arrivals) were good, but latterly the condition has been bad, and the quality suffered in consequence; Calcutta seed hardly maintained its former reputation; Bombay is well spoken of." It is a common practice, in both Russian and Prussian ports, when English ships take in cargoes of these seeds, to bring down from the country boat-loads of the various wild seeds collected by the peasantry, frequently mixed with sand and other refuse. This the merchants are unable to prevent. A vast quantity of other oil seeds, and nuts from which oil is extracted, are also imported, but, not being marketable under their own names, are mixed with the rape or flax oils, sometimes to such an extent that but a very small portion of the latter oils remain. The meal or kernels of these seeds also go into one or other of the two oil cakes. Several of these oils and seeds possess medicinal properties injurious to health, and others are destructive to animal life, one that has been imported from Portugal particularly so. During the past year 64,475 tons of oil-cake were imported, principally from America, but of inferior character to that of home-make; for the first four months of the present year 12,192 tons have been imported.

These circumstances have all operated against any improvement in the manufacture or extraction of the oil from the seed, for those that are tolerably good are generally mixed with the bad, to make the oil and cake at all marketable. The oils are held in the meal of the seed, and, being combinations of certain gases, require considerable scientific care to prevent them from separating while passing through this process; thus the prevailing system of mixing water with the seed, and the temperature to which it is brought, has the effect of putting the oil at once into a state of fermentation, which is a chemical change in oils similar to that of the oxidation of metals; thence their fetid smell, the oil and cake being much injured in quality thereby. A great number of patents have been taken out at various times, to give to them, by artificial means, what nature has failed to do; and to produce and to restore that which the want of better knowledge has destroyed; but they have nearly all failed in their object.

There is another circumstance I would here name, of considerable importance, which ought to be better known. From the high price of oils it has become a common practice to adulterate them with the cheap mineral or other volatile oils, and by divesting them of their colour and smell, it is difficult to detect the adulteration. They are all very inflammable, and such is their volatility that their gases sometimes rise at the ordinary temperature, but if exposed to greater warmth they are rapidly disengaged; these gases being so much lighter than the atmosphere are extremely dangerous, both on ship board and in a manufactory, for they accumulate in any part not well ventilated until they become explosive. The tendency to spontaneous combustion in linseed oil is greatly heightened by this mixture. I have known sawdust mixed with it take fire in six hours; oakum or cotton waste in eight hours; and two narrow escapes from fire on ship board from this same cause. It is not improbable that this circumstance may have had something to do with those lamentable fires which have taken place in factories where oils are largely used, during the past two years. These are the sources from which our machinery is maintained in motion, our lamps made to burn, paints, varnishes, and manufactures supplied, and our cattle fed and fattened.

The consumption of oil has greatly increased in neighbouring nations, but they have increased their cultivation in the same ratio. This increased growth of oil has produced much larger supplies of oil cake, which has been turned to a most profitable account by the Dutch, who have taken to breeding, feeding, and improving their cattle for the British market. France and Belgium, in like manner, have greatly increased their stock, and it is from this large supply of valuable food that they are now successfully competing with Holland in butters, also for the English market. It is from this cultivation of oil that these countries were enabled to export into the United Kingdom during the past year, 94,548 oxen, bulls, and cows, 302,882 sheep and calves, upwards of 10,000 horses, 300,000 hundred weights of butter, and 13,000 tons of oil, besides cheese and various other agricultural products. The importations for the first four months of the present year stand thus: oxen, bulls, and cows, 13,700; sheep and calves, 26,000; butter, 137,287 cwt.; oil, 5000 tons. Holland has always been proverbial for the cultivation of oil-seeds, and it is mainly from this cause that the Dutch farmers are now the most prosperous agriculturalists to be found in Europe.

The rape is a hardy plant, and will grow in almost any climate, but requires attention and care. In India, Russia, and some other countries it is grown in a half-cultivated or wild state, is sown in the spring and reaped in the autumn. The seeds from these plants are small, and are of a hot character, but capable of being brought to greater perfection. I planted one of the East Indian seeds, and it arrived at maturity when about twenty inches out of the ground, with five small branches of pods. By care and management I have brought the produce of this seed in this, the fourth year, to a plant five feet six inches high, with fifty large branches of pods. The plant, as grown in Holland and England, is sown early in the autumn; when it puts out large leaves, from twenty to thirty inches long, and when it arrives at maturity these contribute their gaseous and sappy matter to the formation of a short stalk, which ultimately results in a bulbulous head; in this state it lives through the winter. In the spring it expands upwards, throwing out branches at intervals of from six to seven feet in height. It is harvested early in July. The seed is sometimes sown on one plot of land and the young shoots transplanted in the spring. At other times it is sown in the field where it is intended to form the crop. It averages five quarters to the acre, and by management may be made to produce much more; this crop is subject to the attack of the turnip fly and slugs. When young, and when in flower, a small beetle lays its minute larvæ in the petals, ultimately furnishing the pod with a maggot, which, forcing open the pod when nearly ripe, causes the seed to fall out. But with all these drawbacks it is everywhere acknowledged to be the most profitable crop grown, and the most abundant crops of wheat succeed it in rotation. In Holland its rotation is every fifth year. The straw is valuable as litter and manure. In some parts of Germany the straw is burnt, and the ashes eagerly sought after for fancy soap manufacture. From the beautiful white silvery appearance of this straw, and its fibrous character, it is possible it might be more profitable employed.

The flax plant needs but little explanation; it is everywhere cultivated for the fibre of its straw, without reference to the value of its seed. In England, Ireland, and other parts it is frequently drawn before it comes to seed, and it is only in Holland where the seed is allowed to develope itself, but even there not fully, as there is a prevailing opinion that to develope the seed would injure the fibre of the straw. This idea I believe to be perfectly erroneous. The Dutch also import Riga seed for sowing, on the score of economy, their own produce being much more valuable. Now Russia is not a natural climate for the flax, and there is not a shadow of science displayed in

its cultivation; therefore we cannot possibly form any conception what the flax plant might be brought to, or what its products really should be. The fibre of the straw, as well as the oil in the seed, are substances formed from the gases of the atmosphere, and it will be found the larger the development and vigour of the plant to absorb those gases, the greater will be the perfection of the products. Egypt would appear to be the natural soil of the flax, for we read that Pharoah arrayed Joseph in fine linen; Solomon also purchased linen yarn in Egypt, (2 Chronicles, 1 and 16,) and Herodotus mentions that Egypt was the great emporium for the flax trade. It appears to me that the Egyptian seed of the present day, although in nearly a wild state, is capable of being brought more readily into a high state of cultivation than the seeds of any other country except those of China.

The importance of a suitable oil or substance for the lubrication of mechanism, is one of great magnitude. All pieces of mechanism, the works of man, are nothing less than inanimate bodies, imitations of the works of the great Creator, as displayed in the animate creation; and it is daily proved by practical experience, the nearer the imitation of the one to the other, the nearer perfection is arrived at. Nature supplies all animate bodies with a lubricating oil (synovia), which forms the separating medium between the solid parts of the joints; likewise, all the internal passages of the body are furnished with a like substance, to facilitate the motion of solids and fluids; and the external parts, or outer covering of animals, are furnished with the same oily substance, in quantity and quality according to the density of the element in which they are intended to move, and the velocity they are designed to maintain. Marine animals are striking instances of this. Thus, every animate being possesses the fullest facility of motion, with the least muscular exertion; thus, all mechanism designed for motion must be governed by the same laws, and its economy can only be maintained on the same principles of giving facility to motion, which can only be done by the purity and chemical properties contained in the oil or substance employed for lubrication. This theory is most beautifully developed in that class of mechanism connected with our cotton manufacture. The competition to which this manufacture has been subject has brought such an amount of science to bear upon its economy, that is not to be met with in any other class. Science has brought every portion of the mechanism of the Manchester mill under the strict laws of motion and force, and the most scrutinising tests are employed for ascertaining the facility or the retarding influence any new oil may offer previous to its application. By this course of study such an immense amount of motion is obtained from a given power, and with a wearing of the parts so immeasurably small, that it can only be equalled by motion in the natural body. The power or force necessary to give to the spindle a revolution of three thousand per minute, is so infinitely small that it can scarcely be calculated. With the vast number of separate bodies in motion, some of them travelling at great velocities, the freedom from accidents, and the security to life and property in those establishments, is surprising. Cotton manufacturers consume the largest proportion of the sperm oil imported, for which they pay a high price, a matter, however, of secondary importance, when the increase of power thereby produced is taken into consideration. This is the only class of mechanism upon which artificial power has been properly developed, with the exception, perhaps, of private carriages, where the power of the horse has been greatly economised by the use of patent axles, giving stability and facility of motion, and preventing the destructive influence of oscillation; thus, lighter carriages and cattle are employed, and the speed has been increased, with greater security and at less cost. It is now considered economical to purchase the most expensive oils for the axles even of town carts. Railway and marine machinery suffer greatly from friction, and its inseparable companion, oscillation. The laws that govern motion in the manufactory are precisely those which ought to govern motion on the rail, but these two great interests manage their mechanism on precisely opposite principles; hence the economy of the one and the expensive character of the other. The difference appears to be, that the factory is worked with a view to individual profit, the other for that of a company. The ear of one is ever keenly open to the discoveries of science, the other is ever closed, except it happens to flow through certain favoured channels. However, a new era appears to be dawning upon railway machinery, as two or three of the leading railway companies have accepted the offer of som of their engine drivers to work by contract. If this plan should be liberally carried out by the companies, it will be the first step towards the development of locomotive steam power. The personal interest and responsibility will ultimately work as great changes on the rail as the manufacturer has accomplished in his mill, and will lead to the same principles being carried out in both classes of mechanism. When that is accomplished, it is impossible to say at what speed it may not be perfectly safe to travel, and how much the cost may be reduced. The same remarks are applicable to marine machinery, and if the substances employed as lubricating materials by the large Steam Shipping Companies, and even by the Admiralty, were tested, it would be found difficult to meet with substances offering greater resistance, and, in other respects, more chemically unfitted for the purposes to which they are applied. The purity of the oil supplied to the marine engine is of very great importance. The large bearing surfaces exposed to friction, and the nature of the metallic alloys of which they are composed, (copper, zinc, and tin,) render them susceptible of electrical influence, and that influence once exerted, is always liable to a repetition, producing heat, expansion, and all the consequences resulting therefrom. If this subject were better understood by the companies, or some personal interest brought to bear upon the development of marine power, it would lead to much greater economy in its working, and add much to the speed of the ship. A better knowledge of the science of lubrication might also lead to the idea of lubricating the ships themselves, after the manner of marine animals. If that could be accomplished, the velocity of ships might be much increased. It is quite certain, from the great necessity of economising steam power, that companies and individuals employing it must, sooner or later, employ better lubricating materials; their own interests will force it upon them. But the great question is, where are they to be had. It does not appear possible to obtain a greater supply of sperm oil, or oils or seeds of a better quality than those now imported. Foreigners, as a body, have an objection to adopt anything new, unless, indeed, where they run no risk by doing so; therefore, so long as a favourable market is found for their produce, we shall have no improvement, and it must rest with the home cultivator.

The subject of artificial light is one of considerable importance; our oils are not so pure as those of the French and other nations, but they are much more expensive. The British rape would supply this deficiency, as, from the purity of its gases, it produces the most brilliant light, and is also capable, by an inexpensive and simple process, of being converted into gas, and employed in the ordinary way. Such is the purity of this gas, that 450 cubic feet is equal to 1000 cubic feet of coal gas, and it may be made applicable to the house, the ship, or the railway-train.

It is impossible to say to what extent the value of the flax seed may be increased by improved cultivation, the oil forming the most important ingredient in the manufacture of paints, varnishes, &c.; but from the impoverished and adulterated seeds from which it is obtained, our external painting possesses no body or durability; it is very inferior to that of France and Holland. It is also a well-known fact, that artists have for some years been obliged to abandon the use of this oil, from its impurity and impoverished character, and adopt others of lighter body

of the durability of which we have but little knowledge. The paints employed by the ancients, and others down to the beginning of the present century, were of a very different character to those employed at the present time. The mealy part of these two seeds in which the oil is contained, have ever been considered important articles (after the oil is abstracted), from the peculiar properties they possess. The flax is rich in gluten, and the rape in azote. It is well known that the flesh and muscles of animals are greatly increased by food containing azote, and their fat is derived from those containing gluten. The flax meal, when mixed with water, forms a strong jelly, having so great an affinity for oil that it will absorb three or four times its weight without the appearance of oil being present. It is quite tasteless; thus, the ancients mixed olive or rape oil with water, wine, or aromatic essences, and employed it as food for medicinal purposes, and for anointing the body, &c., &c. The Jews employed oil and wine medicinally, (Luke, x., 34) and had a variety of rules for mixing it; rape oil, mixed in this way, is eaten as food by the Russians at the present day. Whatever effect this food might have upon man, it certainly has an extraordinary effect upon animals, as it rapidly increases their size and weight. When applied for anointing the body it is largely absorbed by the skin, expanding the muscular fibres, and producing an agreeable elasticity and softness. For anointing the feet it is quite a luxury. It is used on the Continent in some parts for extracting the oil from woollens instead of soap. Its affinity for uniting with animal matter is very striking, and, on the other hand, when mixed with the oil of its own seed, its affinity for uniting with vegetable bodies is equally apparent. I am strongly impressed with the idea, that the Egyptians prepared the linen cloths in which they encased their dead with this latter substance, and that it also formed a principal portion of their paint. The meal of the rape possesses the same affinity for uniting with oil and water, but is destitute of the gluten. It is, like the oil, rich in azote. The Dutch farmers have discovered the value of these properties, and are now giving their cattle these two meals mixed with water; the more scientific frequently add the rape oil; the effect of this food upon horses is very striking. It is also a fact long known, that men employed in factories where rape oil has been largely used, soon acquire muscular strength and vigour, and are freed from pulmonary and cutaneous disorders. I find also in the engine-room of steam ships, that the men are more healthy when rape oil is used than when olive or sperm oil is used. The British farmer or grazier can form but a small idea of the disadvantages he labours under from the inferiority of the food upon which he fattens his stock. A large proportion of the rape cake is so bad, that it cannot be given to cattle. It is sold as manure, and it often happens that the oil cake produces disease and sometimes death in the young cattle. There is another most important fact in connection with this description of food,—the excrement or manure from cattle fed upon it possesses high fertilising properties. I have the opinion of some very practical and skilful agriculturalists in Belgium and Holland, who state that they prefer the manure of cattle liberally fed upon this food to guano; they consider it more congenial to the nature of the soil and more lasting in its effect. Those farmers who grow the rape, generally stipulate, when selling the seed, for the return of the cake; by this means exportation is partially prevented.

The cultivation of the rape plant has been progressing in England and Ireland for the last three years, and many of the samples produced have been equal in quality and quantity to the best Dutch seed. But the great evil has been that these seeds when brought to market have been purchased for mixing with others of an inferior description; consequently their value in oil and cake is not known or realised. As to the flax seed but little is produced, principally from the diversity of opinion as to the proper time to draw the plant. On this point information is anxiously sought after and much needed. I am informed there are not less than from two to three hundred thousand acres of flax, and fifty thousand acres of rape now under cultivation in the United Kingdom; and there are many farmers anxious to enter into it, but they require to be informed how to proceed, and how they can meet with a good and ready market. It is of great importance that every encouragement should be given to these productions, and that some means should be adopted to supply the information sought for. This might be readily acccomplished by a united effort on the part of the producer and consumer; and the movement once started in the right direction, public enterprise would accomplish all the rest.

These subjects I beg to submit to your notice as worthy of consideration. The flax and the rape are two of the most interesting and valuable plants to be found in nature. They are capable of furnishing to man the most valuable portion of his raiment, of preserving and beautifying the works of his hands, and increasing the health of his body. They also furnish him with the means of maintaining continuous motion in the inanimate bodies of his own creation; and they likewise supply him with the means of light, when the earth is clothed in darkness. These benefits are presented to him through the divine wisdom of the All-wise Creator. The other portions of these plants present to man an abundance of food for cattle, and furnish him with the means of rendering the earth fruitful.

THE RESOURCES OF GRENADA.

At the quarterly meeting of the Agricultural and Horticultural Society of Grenada, held on the 6th of May, Alexander Bain, Esq., President, in the chair, the following resolution amongst others was passed:—

"5. That the Committee appointed to correspond with the Society of Arts be directed to communicate, without delay, as to the several products of the soil that may be available for commercial purposes, other than the ordinary staples of the country, and that the particular attention of all persons be especially invited to the many valuable suggestions continually put forth by that influential body for further developing the resources of these Colonies, as, for instance, respecting plaintain and other fibrous plants, oils from the cocoa-nut, castor-oil plants, and ground nut, farinaceous substances, dried fruits, &c."

Home Correspondence.

MATERIALS FOR PAPER-MAKING.

Sir,—At the present moment, when we have every occasion to feel alarm at the serious position in which the manufacture of paper is placed, from the scarcity of the materials usually employed for making it, any suggestion, however simple, will not, I deem, be disregarded; especially when we consider how nearly this question is connected with the intellectual welfare of all classes. It is clear that should the present scarcity of rags continue, and no new substances be found applicable to supply their place, the publication of many useful periodicals must be discontinued, and the price of literature greatly enhanced.

Remembering the valuable paper printed in the Journal of the Society (vide vol. I., p. 368) about this period last year, upon the manufacture of paper from cow-dung, in which the author (Dr. Lloyd) stated he obtained a fibre from the dung of cattle, fed, or partially fed, upon flax-grass, I was induced to try a series of experiments, in order to ascertain whether the fibrous portions of common cow-dung, when the animals had been fed upon grass, hay, &c., were not applicable for the same purpose, believing that were a greater tenacity required than this article would afford, it could be more readily and more cheaply supplied by mixing with it a small portion of fibre from other substances, as from old nail-bags, &c.

am happy to report that these experiments have proved, o my mind, most successful, and that this mixture is well qualified for the manufacture of paper for printing purposes. I may also add that this opinion is confirmed y experienced paper-makers.

We have here, then, an almost inexhaustible source of material to supply the place of rags, and one which must necessarily increase with the increase of population. Nor would the use of this substance prove injurious to agriculture, as the fibrous portions of the manure are the least valuable for that purpose, and as the other portions could be returned to the land in the form best adapted to the requirements of plants.

It is not, however, in the present instance of so much importance to show from what substances paper can be made, as almost any fibrous substance is applicable for this purpose, as to point out one that will supply the place of rags, and at a much lower cost. This I believe would be the case with the substance in question, and by supplying a very simple machine to farmers, cow-keepers, and stable-keepers (for horse-dung may also be used), a very large amount of fibre might thus be obtained; it might also be collected from the fields, &c., when more of the soluble portions have sunk into the ground, leaving the fibrous portions upon the surface, affording employment to a class, unfortunately too frequently to be found, whose deficiencies of intellect unqualify them from following more profitable pursuits.

As the results of several experiments, I find that 1lb. of cow-dung yields about 1oz. of dried fibre, and this of course in a condition requiring a much smaller amount of mechanical labour to reduce it to the state of pulp than is the case with rags. Though I have made no very close calculations, I am induced to believe that it may be obtained at a very much lower price than that of rags at the present time. I have found no difficulty in bleaching it, and shall feel happy to forward samples of the unbleached and bleached fibre, also, if possible, of some paper made from it, in the course of a few days.

ALFRED COLEMAN.

Bridgefield, Wandsworth.

On this subject Mrs. Uwins writes:—

"The paper wasps make their beautiful nests from the frothy scum of standing pools and ditches. This grows so fast in summer, that channels an inch deep are covered with it in one summer's day, and in ponds for watering cattle it becomes nearly half a yard thick, and often causes lambs to be drowned; for this reason farmers rake it out, and leave it a thick blanket of green filmy slime on the edge. I have seen it bleached by the exposure to a dazzling whiteness, lying like sheets of cotton wool in the fields, and having all the tenacity of flax and the substance of felt. I have seen the wasps tearing fibres from it in its green state in ditches, and no doubt it could supply an admirable material for paper, and is capable of cultivation to any extent."

Victoria Road, Kensington,
June 28th, 1854.

ON THE DESIRABLENESS OF DISCOVERING SOME NON-INFLAMMABLE PIGMENT WITH WHICH TO PAY SHIPS, THEIR RIGGING, AND TACKLE.

SIR,—It seems to me that the heading of this communication must address itself to every chemist, without a word more from me; yet I may point out that, could such a desideratum be obtained, that is to say, any simple or compound substance as easily to be applied, as impervious to moisture, as durable, and nearly as cheap, and yet not so inflammable as all our gums, resins, oils, tars, &c., now in use about ships, unfortunately are, many lives would be saved. Need I mention the "Amazon," and now the unfortunate "Europa"? If in those cases the running of the fire along the surface could have been retarded even but a little, every life might have been saved. If we cannot make wood absolutely fire-proof, yet, perhaps, something may be done in that direction.

Could alum, or something of a like nature be, by any process, incorporated with tar, so as to render the latter less inflammable without impairing its efficacy?

Perhaps I ought not to have ventured to make any suggestion, only thereby exposing my ignorance of chemistry, but if it should, notwithstanding its incongruity, lead chemists to think of the subject, some good may arise.

It has often been said, and it is generally true, "Only show that a thing is wanted and there are heads ready to invent the means of supplying it"; if there ever was a want I have named one.

I am, Sir, your obedient servant,

HENRY C. LACY.

Richmond, June 26, 1854.

MIDDLE-CLASS EDUCATION AND PUBLIC LOCAL EXAMINATIONS.

Grosvenor-square, June 28, 1854.

DEAR SIR,—I am ashamed of the delay which has elapsed since I promised to write about the adoption of some steps for the improvement of the education of the middle classes, especially those engaged in agriculture. But the subject is one requiring much consideration, and my time and attention have been unfortunately much occupied by my pamphlet on the Self-Government of London.

The education of the lower classes, though still very far from adequately cared for, has unquestionably of late made much more progress than that of the class next above them. Not only have large sums been granted by the State, and given by the charitable, to establish and maintain schools, schoolmasters, and pupil-teachers, for the children of the independent labourer, but large sums have also been granted by the State, and voted by the guardians, for workhouse and district schools, in order to afford a good education to pauper children; and many of these schools, such as those of Norwood, Quatt, Anerley, &c., will bear comparison with any schools in the country, whether as regards religious and intellectual education or practical industrial training.

No efforts (on at all a commensurate scale) have been made to improve the education of the middle classes in general, or of that portion of them with whom I, as a country gentleman, am most concerned, and in whose welfare I feel the deepest interest.

The too general want of enlarged education among the small farmers in times past has inclined them to undervalue its importance to their children, as compared with the profit to themselves of the children's work, and the future advantage to the children of early industrial training. Moreover, the sturdy spirit of self-dependence which is the noble characteristic of the great body of our English middle classes, leads the farmers to dislike any place of education wearing anything like an eleemosynary aspect, and to prefer private schools for their children when they give them any education at all beyond the first rudiments at a very early age. These private schools, though their charges are much higher than those of the Parochial, National, or British schools, are, for the most part, from what I hear, decidedly inferior to them. The masters of these schools, though there are many most honourable and meritorious exceptions, are yet too often persons who, having proved themselves unequal to all other business, are considered quite equal to the easy and unimportant task of instructing the minds and forming the characters of the men and women of the coming generation; while their schools, being private schools, are uninspected by any competent judges, and they thus lose the benefit of the instructive criticisms and friendly suggestions of that valuable body of men, the Government school inspectors. Nor can I altogether condemn, though I cannot but deplore, the sturdy English feeling which leads them to resist intru-

sion and interference. But the result of a continuance of this state of things—of the non-attendance at school of many farmers' children, and the attendance at indifferent schools of many others—cannot be doubted. Inferiority in instruction must gradually lower the position of the less educated among the large farmers' children, and cause the children of the small farmers, with small capital, to change places before long with their more highly-instructed labourers. This is already seen by the more intelligent among themselves; but it is precisely those who least foresee this fate for their children that most require some friendly interference to avert it.

All unnecessary inversion of the actual order of society is in itself to be deprecated, the suffering thereby caused to the party depressed being out of all proportion greater than the happiness added to the party elevated. So clearly is this principle recognised by our law (as, indeed, by that of all civilised nations, ancient or modern), that by the Statute of Limitations it affirms persistence in long-continued injustice to be less injurious to society than justice too long deferred; and confirms the wrongful title of an old intruder's children, rather than cause confusion and hardship by establishing the rightful owners in their stead. But in the case of the educational deficiencies of the middle classes, and especially of the farmers, the evil to be remedied has arisen in no small degree from their meritorious spirit of self-dependence. It would, therefore, be most unjust as well as cruel, to acquiesce contentedly in their being superseded as a class by their inferiors, in consequence of the public and private aid afforded eleemosynarily to the latter. Nor would it be less impolitic than cruel and unjust, for that very same honest family pride and horror of dependence, so honourably distinguishing our middle classes, has been sadly impaired among the lower, by the action of our system of poor laws; so that the labourers, if elevated to a level with the farmers, with equal knowledge and equal advantages in other respects, would, in general, prove decidedly inferior to them in some of the most valuable of our national characteristics.

Two cases of prosperous tradesmen (sons of day labourers) allowing their parents to receive not only alms but parochial relief, have, while writing this, come under my own observation. I have heard, from good authorities, numberless similar instances, some of the most revolting description. But who ever heard of hereditary tradesmen or farmers, much more of our poor clergy or gentry, permitting such an arrangement? A sense of shame, and of that honest family pride to which I have referred, quite apart from family affection, forbids their doing so.

Devonshire being a county of small farmers, these considerations had for some time pressed heavily upon my mind. On every ground, public and personal, I deplored the decay I saw too clearly impending over a class endowed with so many sterling qualities particularly valuable at the present day, and, moreover, having the strongest claims upon my personal sympathies; but I did not see how to avert their doom.

Several efforts had been made, but made hitherto with little success, to improve the education of the farmers. The College at Cirencester had been established, to which I was a very early subscriber. It has lately, I understand, been working very successfully; but though it has educated many to be farmers, it has hardly numbered one farmer's son among its pupils; and its failure to answer this, its more especial object, proves that the remedy is not to be found in new and expensive institutions, in grand gothic buildings, with costly staff and establishments. An education in such, to be self-supporting, must be expensive, and unless self-supporting, it acquires an eleemosynary taint. Some time, however, last winter, it occurred to me, or rather to a friend of mine with whom I had been talking over the matter, that it might be possible, by providing for young men of the middle classes, and especially for young farmers, prizes for competition, and a standard of acquirements, to make a successful effort to develope the intelligence and spirit of application now, from want of incentives and guidance, lying dormant in many a farmer's son; and to cause either the voluntary self-improvement of many existing private schools, or else the spontaneous establishment of many better ones in their stead.

The following is a sketch of the notion which occurred to us as the best means for attaining our object:—

That in the chief county town a yearly examination should take place under the patronage of the lord-lieutenant, county magistrates, or other influential persons connected with the county; at which examination all youths and young men of the county, whose parents or near relations were, or had been, in respectable and independent circumstances, might apply for a "County Degree," and compete for "County Honours."

That the "County Degree" be intended to fix and maintain a standard of education becoming an Englishman of the middle class.

That the "County Honours" be the reward of excellence in any one or more of the practical departments of knowledge, such as Agriculture and the Management of Stock, Chemistry, Mining, Navigation, Engineering, &c.

That, in addition to the "County Degree" and "County Honours," individuals be invited to connect with these examinations special prizes and scholarships.

The sole expense of this proposal would be the salary of a secretary to conduct correspondence, and the payment of examiners, many of whom, however, would be sure to act gratuitously.

If it should succeed, a very small fee on the conferring a degree (say 10s.) would provide a liberal sum for the secretary and examiners; and the expense of the "County Honours" (which would carry with them some substantial reward, such as books, valuable medals, &c.) would be met by a very small contribution on the part of those who take an interest in the county examinations.

"The County Degrees" would, of course, be recorded in a public register, and a "Book of Honours" kept.

"The Degree Paper, or Diploma, given to each successful candidate, should be stamped with a county seal, and signed by the examiners, and perhaps also by the lord-lieutenant or some other person of eminence in the county."

I had satisfied myself, from several inquiries I had made of persons likely to be right on such points, that (provided of course a sufficiently influential body of the gentry expressed their concurrence in the scheme, and their disposition to view with favour, and, *cæteris paribus*, give a preference to those who distinguished themselves at these examinations), this degree, thus stamped with public approbation, would be considered by any who came up for examination well worth 10s. to them as a testimonial, and, so to speak, a passport to favour and employment.

Of the friends to whom I mentioned this scheme, none expressed any positive disapprobation; all, but one or two, approved highly of the outline I had given, and at once said they were quite disposed to entertain favourably the proposal of working it out. I may mention among members approving, Lord Lansdowne, Lord Harrowby, Lord Yarborough, Lord Stanley, M.P., Lord Courtenay, Lord Ashburton, Sir Stafford Northcote, Mr. Sotheron, M.P., and Mr. Tanner Davy, a well-known Devonshire agriculturist, farming his own estate.

But when I informed them of the communications I had had with you since my arrival in town, and of your having made me aware, for the first time, that the Society of Arts had already taken steps for holding examinations of the members of Institutions in Union with it, and for granting certificates of merit, these gentlemen felt with me that, even if the Society, on account of its comprehensive character as a Society for the Encouragement of Arts, Manufactures, and Commerce, on account of the services it has rendered to Agriculture as well as to other arts, on account of its long existence, and of the illustrious patronage it enjoys, did not present

(as we think it does) peculiar advantages for carrying out such a national scheme; it would be a pity needlessly to prepare and put in motion two sets of machinery instead of one, to effect objects so nearly identical, and apparently so readily attainable by a joint action, at once more powerful and less costly than separate action could be. They therefore agreed with me that the proceedings of the Society of Arts would render it expedient to defer taking further steps for the prosecution of the scheme I had sketched out, at any rate till we had satisfied ourselves of the hopelessness of attaining our end by means of some arrangement with the Society.

This, from what passed between us when I had the pleasure of seeing you upon the subject, I venture to hope may prove not impossible.

But the classes of which we have been speaking, the farmers and artisans, differ so much in their circumstances and requirements, that for the purpose of dealing with both successfully, it is clear some modifications, or rather extensions of the constitution of branches of the Society of Arts, of the already prepared machinery for conducting its examinations, and of the character of the examinations themselves, would be indispensable. Moreover, in my opinion, some changes in the kind of certificates or honours to be given to those who have passed their examinations with credit or distinction might be most advantageously made.

We will take these questions, if you please, in succession.

In the first place, then, farmers are not mechanics, and will not belong to Mechanics Institutes. Under your present system, if I mistake not, each separate provincial Institution in connexion with the Society of Arts becomes, so to speak, a branch of the Society, by paying the annual subscription required from every member; and thus not only obtains with regard to the publications, &c., of the Society, the privileges of an individual member, but also obtains with regard to lectures, &c., privileges not available for individual members of our central Society; it further, in its character of a branch of the Society, obtains, with respect to access to the rooms and admission to the lectures, &c., of the Society, for each and all of its local members, privileges in no way distinguishable from those of individual subscribing members of the Society paying their annual two guineas. It is obvious that the constant relations between the metropolis and the active and generally large towns where Mechanics' Institutes are chiefly found, must be very different from any which could be established between any body of farmers and the Society here in London; and that, therefore, though for the one no intermediate bond of union is required, yet that is no reason against establishing it in the case of the other. From all I have been able to learn, some county or at least provincial organization of branches would be indispensable to ensure, on the part of the farmers, any interest in the proceedings of the metropolitan Society of Arts. When I say provincial, I mean something analogous in character to the Bath and West of England Society for the encouragement of agriculture, arts, manufactures, and commerce, whose sphere of action comprises the counties of Devon, Cornwall, Somerset, and Dorset. Practical men agree, that without something of the sort to connect farmers in the country with our remote Society, it would be hopeless to get any scheme to work. I venture to think, therefore, that county or provincial branches, as local centres of correspondence and action for the farmers, would be desirable.

On the other hand, a county or provincial organisation, in the case of very large, wealthy, or populous counties or districts, would, without smaller subdivisions, neither put the scattered farmers into sufficient communication with the Society in London, nor (which is more material) make a sufficient return, in the shape of its single subscription of £2 2s., for the advantages placed by the Society within reach of its local members.

In such cases, the analogous example of the Yorkshire and other provincial or county unions would seem to suggest, *mutatis mutandis*—the very organisation required. For the Yorkshire Union, comprising some 130 Institutes, (of which all contribute, according to a certain scale of payment, to its support, and about a quarter are also in union with us in London)—stands itself, as regards its annual subscription, on the same footing with respect to the Society of Arts as any of the 362 Mechanics' Institutes in Union with us. Still, though it does not interfere between them and us here, and, of course, is not allowed to extend to Institutions in Union with it, but not with us, any of the benefits afforded by our Society beyond that of being able to give them good advice derived from our Journal, it certainly exercises a very powerful and useful influence upon them. It corresponds with the various Yorkshire Institutes in Union with it, ascertains their condition and prospects, collects and records their statistics and proceedings, diffuses information among them, facilitates their making arrangements among themselves for their mutual advantage and convenience, and forms a general bond of union and co-operation among them.

In other cases, such as those of poorer, less advanced, or smaller counties, recourse might be had to something like the organisation already recognised by the Society of Arts in the case of the Hants and Wilts Educational Society. This Association, as it was established with its branches in different villages solely for the institution and interchange of village-lending libraries and gratuitous lectures, and comprises no institutions of the nature of Mechanics' Institutes, has recently had the privilege granted it, in return for its single subscription, of enabling all the members of its different branches to profit by the examinations of the Society. In other cases, advantage might be taken of the power which the President of any Institution has, of making his own single £2 2s. subscription available to place his Institute in Union with our Society here in London.

Upon these questions I have no right—were I fully competent to do so, which I feel I am not—to propose any definite arrangement. These are precisely the points on which the Conference is specially qualified and authorised to decide. I would only further remark, with regard to such sub-divisions that, in the case of Mechanics' Institutes, they generally determine themselves. Mechanics' Institutes, except in the very largest towns, being naturally established one in each place. But the case of the country is quite different, and would most likely hardly admit of being dealt with on any quite uniform plan. The districts of small local agricultural societies in some cases, in others some association of parishes (such as that round my father's place in Devonshire) for the periodical interchange of their respective lending libraries, in others perhaps the boundaries of the Poor-law Union, might suggest a convenient area for the operations of a branch society. But if the principle be favourably received by the Conference, and by the gentry and farmers generally throughout the country, when it is submitted to them, I anticipate no serious obstacles; for the points I have just mentioned would not be very difficult to adjust, if taken in hand with a willing and conciliatory spirit. And in these days of happily increased and increasing sympathy and intercourse between the higher, middle, and lower classes, of earnest and self-denying toil for the improvement of the rising generation, there is no fear but that plenty of competent persons are to be found among the gentry, the clergy, and the more educated of the middle classes, who would, upon the mere payment of their expenses out of pocket, gladly undertake, without fee or reward, the useful but not habitually laborious duties of acting under the name of presidents, secretaries, or treasurers, as the organs and managers of branch associations in the country.

The next point to be considered is the machinery prepared for the proposed examinations.

Owing to the restricted character of these examinations and the limited amount of funds, I find that the Society

have pretty well made up their minds that they cannot do much more in the matter than issue printed examination papers, make arrangements to prevent, as far as may be, unfair conduct on the part of those who are to answer in them, and award prizes and certificates on the imperfect data furnished by the answers to these papers returned by the several Institutions, to be looked over and adjudicated upon in London. But if the co-operation of those who are interested in land, could be obtained towards enlarging the original sphere of the usefulness of these examinations, so as to embrace all the subjects naturally comprised in the education of the different classes of our countrymen, whether engaged in manufactures or agriculture, in trade at home or commerce abroad; it cannot be doubted that larger resources would be available for the purposes of the Society.

A part of these increased resources could not, I think, be better applied than to the improvement of the examinations, by sending down to each place of examination one or more examiners, of such experience in the work and of such eminence as to command respect; and while thus providing for the better conduct of the examination by printed papers, by superadding to that *viva voce* examinations, the importance of which is in general, I think, hardly adequately appreciated among us.

I met with some very interesting particulars the other day in a number of the *London Review* of the year 1827, respecting the successful working of the *viva voce* medical examinations in France, called the *concours;* and they were quite borne out to me by a communication I had on the subject with a young medical man who had lately undergone it. I remember some striking observations of that distinguished educator, the late lamented Dr. Arnold, on the advantage of *viva voce* examinations; and, when properly combined with written ones, of their effect in bringing forth into due, though not disproportionate, prominence several valuable qualities; such as presence of mind, promptitude in bringing previously-acquired knowledge to bear upon any unexpected point, and facility in turning that knowledge to account by stating it at once in a clear and intelligible manner. Some of the further advantages of *viva voce* examinations, in enabling the examiner to test with far more accuracy the real amount of the student's available knowledge, and to detect mere cramming, are most clearly stated, and supported by quotations from the evidence of high practical authorities, in pp. 51 and 52 of the admirable Report of the Committee of the Society of Arts last year on Industrial Instruction.

The next point to be considered is the extension of the subjects to be embraced in the examination. Upon this point there could hardly be a difference of opinion. The principles of agriculture and of the management of stock, together with a certain amount of chemistry, considered in its relation to these arts, would obviously, for the sake of the farmers, require adding to the subjects enumerated in the circular issued last May by our Society respecting the examinations; while, to make the course complete, something of the principles of mining and of navigation would seem desirable besides, in those parts of the country where mines or shipping are to be generally found.

I have now very briefly touched upon the several modifications and extensions I mentioned some time back as, in my opinion, either indispensable, or highly conducive, to the successful occupation by the Society of Arts of the enlarged sphere of usefulness I have ventured to propose. Thus much of the extended scheme would, I firmly believe, work satisfactorily enough, and render good service to the country, if taken up heartily by the different classes and interests which are at length happily discovering how much more intimately they are all concerned in each other's welfare than for a long time they had been willing to suppose. But I cannot help hoping that the Conference will consent to proceed a little further—that it will agree with me as to the desirableness of profiting by the present opportunity to encourage the acquisition of certain other branches of knowledge less special in character, and less immediately telling, perhaps, upon any particular trade or calling, but not on that account the less essential to those whose benefit we seek in the examinations already proposed. Carlyle, if I mistake not, speaks somewhere of the necessity of looking at our operatives, not as mere weavers and spinners, but as weaving *men* and spinning *men;* not as *hands*, but as *men* partaking of our common nature, and entitled to have the claims of that common nature fitly recognised. Without entering here upon the highest sense in which these words might be taken in reference to a future state, I may venture to press the importance of considering our population as consisting not merely of fellow-men, but of brother Englishmen, sure, in these days of extending franchise and increased power in the masses, to exercise a powerful influence for good or for evil upon the destinies of our country. No course of instruction we could give them, no course of study we could encourage them to pursue, with a view to their particular callings alone, could claim the title of a complete education calculated to qualify them for the performance of the social and political duties, attaching directly or indirectly to every citizen of a free country. This is not the time or place to speak of the excellencies or defects of the system of education in our Universities for the higher classes; but there is one feature in it which, theoretically at least, I think we must all approve,—that of obliging each candidate for a degree to pass a certain examination in the several branches of academical learning which are considered indispensable by the University; and of making the attainment of the highest honours in any special branch dependent upon the manifestation of a moderate but competent acquaintance with the other recognised branches of academical learning. Indeed, at Cambridge, the most consummate classical scholar is required to prove a more than moderate knowledge of mathematics before he can be placed upon the Classical Tripos. And I well remember a friend of my own, of considerable learning and ability, being shut out in consequence, from the distinction he would otherwise certainly have obtained.

I will not touch the disputed point, whether or not the man of sound general training will be likely to surpass, even in his own pursuit, the man who has entirely devoted his whole faculties from childhood upwards to that one pursuit; still less will I, on the other hand, question the usually greater usefulness and superior intellectual condition of the man who has learnt a few things really well, and has completely mastered them, compared with that of one who has only a superficial smattering of many things. But still, in the case of those for whose benefit the examinations are proposed, I believe we shall agree that it would be desirable, with a view to their general fitness for their duties, public and private, for their general education to have comprised some little acquaintance with the history of their own country, and the geography of the British Empire, a complete mastery of the simpler rules of grammar and arithmetic, to say nothing of some knowledge of "common things."

I venture therefore to think, that while it would be still right for the Society to proceed in the course it had originally proposed, as regards the holding of examinations in particular subjects, and the giving certificates of merit for proficiency in them severally, the Society might advantageously at the same time adopt a part of the project which, in ignorance of your proceedings, I had been separately urging; so much of it, I mean, as involves the granting of *degrees* for the purpose of establishing and maintaining a standard of education befitting an Englishman, either of the middle class or of the *élite* of that next below it. Something of a standard of acquirements on some points you had already seemed to recognise as necessary. For I observe that in the circular in the *Journal* of the 7th of April last, fair penmanship and good spelling are announced as indispensable conditions for the obtaining of any certificates at all. It would only, I think, be an

extension of the same principle to say to the candidates, "We are willing to grant certificates of merit of different classes for proficiency in certain branches of study, but we will found a higher kind of "*honours*" (analogous to the triposes at Cambridge and the classes at Oxford) for proficiency in the same and other branches. To these honours alone the more valuable prizes will be attached, and these honours shall be open to none who have not taken an ordinary "degree;" that is, who have not, by passing a graduate's examination, proved themselves to possess a certain moderate amount of general acquirements such as no Englishman of your position ought to be without. The want of these acquirements will prevent our certifying you to be an educated man, however eminent may be your attainments in some one particular line."

And this brings me to a point which I cannot approach without much diffidence and hesitation, knowing the difficulties which it has caused about schemes much larger, and affairs much weightier than those of the Society of Arts. If the Conference should agree with me that it is expedient for the Society to make arrangements for granting the degree of graduate analogous, on a humbler scale, to that of an University M.A. or B.A., and implying, as that is supposed to do, the possession of certain general attainments to be expected in an Englishman of a certain position, how can we altogether ignore religious knowledge as an obvious branch of an education, *ex hypothesi*, appropriate for a citizen and man.

I have throughout assumed that we have been looking at men in their relations to each other and to the material world, and not in their infinitely higher and more important relations to their Maker. The constitution of the Society of Arts happily enables men of the most opposite creeds and politics to co-operate cordially in the promotion of objects which they each know and feel not to be the highest aims of their lives, but which yet being, as far as they go, good and useful in themselves, they can heartily concur and combine to advance. Even if I had not the pleasure of being associated in the Society with gentlemen, if I may say so, holding more exclusive opinions than my own, I should have been one of the last men to hesitate in joining such a body. Nothing in my religion or political tenets, as my public conduct has sufficiently indicated, would, of itself, at all dispose me to exclusiveness or intolerance. I feel, as strongly as any man can, that anything like a religious test or profession of faith would be utterly incompatible with the whole spirit of our body. But it is quite clear to me that (looking upon men, as I said we must, in our capacity of members of the Society of Arts, in this lower point of view exclusively) no one can, with any show of reason, be called an educated man who is not *acquainted*, to a certain degree, with Scripture history (whether he believes or not is beyond our present purpose), who has not some knowledge of the contents of the Bible—to speak of it with perfect truth, though in how infinitely lower a point of view than I trust we, one and all of us, habitually regard it in.

The Book must be recognized as the most wonderful and wonder-working volume that ever appeared on earth. What can a man know of the history of the world, how can he understand anything of the laws, institutions, and literature of this or any other civilized country, since the time of Constantine, if he is wholly unacquainted with the contents of that Book and the religion it teaches? This is not the occasion even to glance at the controversy raging between the advocates of purely secular and religious education in public establishments. I would only remark that, whether rightly or wrongly, public opinion has hitherto pronounced itself strongly in favour of the latter; and that this appears to me a fact, which though not at all conclusive, yet ought not wholly to be left out of sight in the consideration of the present question.

My own individual impression is, that the broad, comprehensive, and unsectarian character of the Society of Arts could be perfectly maintained, and public opinion satisfied, in what I believe to be its not unreasonable requirement of some knowledge of Scripture on the part of persons purporting to be well educated; that the rights of conscience would be fully respected on the one hand, and the transcendent importance of religious instruction in every point of view, even down to the lowest and most worldly one, would be adequately recognised on the other, if as one of the conditions indispensable to attaining a degree, each candidate were required to produce a certificate of competent religious knowledge, signed by (say) two ministers of his own persuasion. I put forward those views, with regard to this kind of certificate, with much diffidence, because they may at first sight seem calculated, if adopted, to place the Society in a new position. It will be for the Conference to weigh them maturely. My own firm conviction is that, if fairly considered, they would be found in no way conflicting with the spirit or operations of the Society. Whether this certificate be adopted or not, the question of the sort of standard to be required for a graduate's degree would not be affected. My own idea would be that, in the first instance, at any rate, some such standard as the following would suffice: Reading, fluently and correctly, writing correctly from dictation, an elementary knowledge of grammar, good penmanship, and elementary knowledge of arithmetic and book-keeping, and a general acquaintance with the outline of English history, and of the geography of the British Empire.

I mention book-keeping, because it appears peculiarly desirable that the agricultural population should follow the example of that of the towns generally in learning the principles and adopting the habit of keeping accounts. Up to the present time, farmers, as a general rule, are very deficient in this respect. The rest of the subjects speak for themselves.

I may be partial in the estimate I have formed of the probable results of a measure on which my mind has been so long and earnestly dwelling; but I cannot help thinking that great good will result to the community, both directly and indirectly, from the adoption of some such system as I have ventured to sketch out—directly to the improvement of the education of the middle classes and the elevation of their standard of attainments—indirectly in the recognition of a more extended identity of basis for the education both of the middle classes and of the *elite* of that next below them, before the commencement of that complete divergence into separate pursuits and callings which in those classes takes place at a much earlier age than it does in the higher classes, and, in my opinion, decidedly too soon for their own individual advantage, and for the homogeneity, if I may use the word, which ought to pervade the classes of a united nation, whatever be their several trades or callings.

I have, in conclusion, only to apologize for the length to which this letter has unintentionally grown, and to ask your kind assistance in getting the subject of it fairly and, I would fain hope, favourably considered by the Conference next week.

I remain, dear Sir,
With great truth, yours faithfully,
EBRINGTON.

H. Chester, Esq.

Proceedings of Institutions.

Gravesend.—The sixteenth annual report of the Gravesend and Milton Mechanics' Institution congratulates the members on the substantial progress that continues to be made. The number of members is 376, being an increase of 26 in the year. These consist of day annual 112, evening annual 27, day quarterly 7, evening quarterly 200, juniors 30. It records the donation of 200 volumes,

value 20*l.*, from Mr. C. Jennery, on condition that a like sum was raised by subscription amongst the members, to be applied to the improvement of the library. This condition has been complied with, a sum of 20*l.* 1s. having been collected, of which 15*l.* 17s. 9d. was expended in the purchase of 89 volumes. The books issued from the library during the year amounted to 5490 volumes. Greater expense had been incurred in the matter of lectures, of which 18 had been delivered, than on former occasions, and the result was perfectly satisfactory. The lectures had been delivered in the Town-hall, the National Free School, and the Theatre, all of which had been lent without charge. The Committee expresses the hope that means may shortly be devised for obtaining a spacious Lecture-hall and class-rooms in connection with the Institution, the want of which alone prevents the establishment of classes. The receipts amounted to 226*l.* 13s. 5d. and the disbursements to 223*l.* 10s. 4d.

Highgate.—A numerous meeting of the members of the Literary and Scientific Institution was held on the 26th inst., to present their President, Mr. Harry Chester, with an elegant silver candelabrum, as a mark of their esteem and regard. The proceedings were prefaced by a short but interesting lecture by the Rev. A. Barrett, on the Art of Printing from Nature. Mr. Beaumont, one of the Vice-Presidents of the Institution, then addressed the meeting and Mr. Chester, who occupied the chair. He stated that Mr. Chester had presided over the Institution for fifteen years, and with unwearied ardour. He had been its founder, and his great object had been to carry out the principle embodied in the first rule:—"The design of the Institution is to promote the interests of religion and morality by the cultivation of literature, science, and the fine arts, and by the diffusion of useful knowledge." He had announced this design in his opening address; but he had not contented himself with an inaugural address, but had delivered lectures himself—had procured gratuitous lectures from others—had organised classes—had contributed to the Library and Museum of the Institution—and had, besides, by his influence, made it the medium of promoting objects of general utility in the neighbourhood, of which Mr. Beaumont instanced the sanitary improvement of the place, and especially the establishment of 80 or 90 cottage allotment gardens. It had been their advantage to have at their head a gentleman who constantly imparted health and vigour to the Institution by the suggestion of new ideas; and, while many other similar Societies in the neighbourhood of London had failed, their Institution had made continual progress. Their debt was paid; they had more than 3000 volumes in the library; they had most efficient officers; and several able and gratuitous resident lecturers; and they had still their President. Recently, too, the Institution had been considerably strengthened by its union with the Society of Arts, and this advantage they owed to Mr. Chester; and they had now met together, not to offer him a mere formal or conventional compliment, but cordially to congratulate him upon the success of the work which he had instituted, and upon a steady and persevering adherence to the principles upon which the Institution was founded; and, in presenting him with the candelabrum which all classes had united in procuring, to assure him that it was accompanied by the affection and goodwill of his friends and neighbours at Highgate. Mr. Chester replied in suitable terms, expressing his gratitude to the members and associates of the Institution, for the constant kindness which they had shown him, and for the beautiful and valuable present which he had now received. Reverting to the origin of the Institution, and to its early struggles for existence, among the prejudices which then prevailed, he congratulated the members upon the entire disappearance of those prejudices, upon the cordiality which had always prevailed in the Committee of Management and among the members, upon the business-like straight-forwardness of all their proceedings, and upon the great power of usefulness which they now possessed. He reminded the meeting that it was in the room in which they were now assembled, that he first broached the idea of the Union of Institutes with the Society of Arts. That union now embraced 355 Institutes, including their own. Having made some further observations, and again thanked his friends and neighbours for their kindness, Mr. Chester sat down amidst long-continued applause. The meeting then separated. The following is the inscription on the candelabrum:—"Presented by the members and associates of the Highgate Literary and Scientific Institution, to their President, Mr. Harry Chester, in acknowledgement of the eminent services rendered by him in the formation of the Institution in January, 1839, and to record their deep sense of his unwearied and successful exertions during the whole period of his presidency to promote the important objects for which the institution was established." After the proceedings of the evening an extensive and highly interesting collection of specimens of printing from nature and of photography, for the loan of which the Institution was indebted to the Society of Arts, was exhibited, and it was announced that the exhibition would be open during the two following days.

Huddersfield.—On Saturday week the members and friends of the Mechanics' Institution, to the number of two thousand, visited Kerklees Park, the seat of Mr. Wickham, M.P., who had kindly offered the use of the grounds for the annual fete. The greater number of those availing themselves of this kindness were taken to the park at a reduced rate by the London and North Western Company, but a number of other modes of conveyance were also in requisition. From the fact that a considerable proportion of the Huddersfield firms give their employés the Saturday afternoon, the working men and their families, who in this town so largely support the Mechanics' Institution, were enabled to attend, and the 50 or 60 classes which meet nightly within its walls sent nearly all their members to the fete. Dancing, rustic games, and temperate refreshment enabled the party to enjoy their four or five hours' relaxation.

Wolsingham.—The First Soirée of the Mechanics' Institute and Literary Society was held on the 24th ult., in the large tent of the Wear Valley Floral and Horticultural Society, which was tastefully decorated with evergreens and banners bearing appropriate mottos, when a party of not less than 180 partook of tea and other good things. The Wolsingham Quadrille Band and the Wolsingham Choral Society were both in attendance, and contributed greatly to the evening's enjoyment. In the unavoidable absence of Charles Attwood, Esq., of Forr Law, the chair was taken by Henry Pease, Esq., of Pierremont, who opened the proceedings in a spirited and with an appropriate address, which at several stages drew forth the warmest plaudits of the assembly, by this time consisting of 460 persons. The Rev. Henry Slater, of Stanhope, next addressed the meeting. After a brief interval the chairman again rose and said, that as he had been one of a deputation which had lately journeyed to St. Petersburg, he had been requested to give a sketch of his interview with the Emperor of Russia, &c., and as it might be interesting to the company, he had great pleasure in doing so. He also exhibited many specimens of Russian manufacture, the inspection of which appeared to give great gratification, and concluded his address by passing some flattering compliments to the Secretary and other officers of the Society. A vote of thanks to Mr. Pease for his great kindness in filling the chair, and also to the Rev. Henry Slater for his presence, were proposed, seconded, and carried unanimously. The Institute now numbers 108 members, being an increase of 74 since the 1st of January last, at which time there was only 34. At the last annual meeting a new and greatly improved code of rules was passed, to which, and the exertions of the Committee of Management, the present prosperous state of the Institute may be ascribed.

Miscellanea.

Turf Paper.—The energy and perseverance displayed by some of our manufacturers in developing the process of making straw paper, and the perfect success which has attended their efforts, is a sufficient guarantee that if some of them could be induced to turn their attention to that of making turf paper, or turf bogs, from being fringed with misery and starvation, would soon be surrounded by the fruits of industry. Turf bogs of a considerable extent and thickness, and very generally of ligneous character, are found in many parts of Piedmont. This peculiar quality of the turf appears to have first suggested its use as a material for paper making, and accordingly a number of trials were instituted at Turin, which appear to have been remarkably successful. From these experiments we learn that certain kinds of turf may enter into the composition of paper, to the extent of from 80 to 90 per cent., and into that of millboard even to 95 per cent. The other materials employed in addition to the turf were indiscriminately old ropes or bagging, and the bark of the mulberry. The economy of using turf instead of the materials now employed is stated to be fully 50 per cent. In Germany also, successful experiments have been made within the last few months of the same kind. Mr. Keller, of Kuhnheide, in the Saxon Erzgebirge, has manufactured some excellent paper of low qualities from fibrous or flow peat, which possessed considerable strength, and had a sort of fatty feel, which appears to render them particularly well adapted to form packing paper for certain goods. Even so far back as 1838, Mr. L. Pipette, in a small book which he published at Cologne, upon the different indigenous substances from which paper might be made, showed that a good common paper might be produced from the upper layer of fibrous turf. From his statement it would appear that 100 lbs. of turf would only yield 25 lbs. of paper, but this proportion would no doubt vary very considerably. But even assuming that dry turf only produced one-fourth of its weight of paper, it would still be the cheapest material that could be employed. On the edge of a large bog turf can be readily had in large qnantities for 2s. 6d. per ton; so that the raw material of one ton of paper, exclusive of a little scutching waste or other strong fibre to give strength, could be had ready for 10s. The process of manufacture of turf paper resembles in many respects that now followed for making straw paper. As a material for making all kinds of papier mache and carton pierre, turf paper, from the low price at which it could be produced, would be invaluable. Papier mache has already been applied to a thousand uses, but it is still far from having received one-tenth of the development of which it is capable, and which no doubt it will receive if paper could be produced at a much lower price than it is now, and if the present impolitic and oppressive duty were removed.—*Journal of Industrial Progress.*

To Correspondents.

*** In reply to inquiries, the Secretary begs to state that Mr. S. T. Davenport will be ready to receive payment for the Dinner Tickets at the Crystal Palace on Monday next.

MEETINGS FOR THE ENSUING WEEK.

Mon. Royal Inst., 2.—Monthly Meeting.
Society of Arts, 4½.—Centenary Dinner at the Crystal Palace.
Entomological, 8.

Tues. Society of Arts, 11. Conference of Representatives of Institutions in Union.
Society of Arts, 9.—Conversazione. Opening of Educational Exhibition.

Wed. Royal Botanic, 2.—Exhibition.
Society of Arts, 8.—Election of Officers.

Thurs. Zoological, 3.

Sat. Asiatic Society, 2.
Horticultural, 2.—Exhibition.
Royal Botanic, 3½.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 22nd June, 1854.

Par. Numb.
273. Erasmus Smith's Schools (Ireland)—Abstract of Returns.
236. Small Arms—Index to Report.
142. Bills—Valuation of Lands (Scotland) (as amended in Committee on re-commitment, on second re-commitment, and on third re-commitment.
146. Bills—Poor Law (Scotland).

Delivered on 23rd June, 1854.

309. Convicts—Return.
310. Copper, &c.—Account.
148. Bill—Registration of Bills of Sale (as amended in Committee and on re-commitment).
China (Attack on the Foreign Settlements at Shanghae)—Correspondence.

Delivered on 24th and 26th June, 1854.

296. Tallow, &c.—Return (a corrected leaf).
319. Post Office (Number of Chargeable Letters)—Return.
320. Post Office (Gross and Net Revenue)—Accounts.
321. Cheese—Account.
147. Bills—General Board of Health.
149. Bills—Episcopal and Capitular Estates (amended).
151. Bills—Drainage of Lands (amended).
150. Bills—Nuisances Removal, &c.
152. Bills—Oxford University (as amended in Committee, on first and second re-commitment, and on Consideration of Bill, as amended.

Delivered on 27th June, 1854.

316. Procurators Fiscal (Scotland)—Return.
318. Railways (India)—Return.
323. Sheriff and Sheriff Clerk of Chancery (Scotland)—Return.
324. Churches—Account.
153. Bill—Medical Graduates (University of London) (amended).

Delivered on 28th June, 1854.

314. Complaint (7th February)—Report from the Committee.
325. Accidents in Coal Mines—4th Report from the Committee.
326. River Tyne—Copy of a Letter.
156. Bills—Bills of Exchange and Promissory Notes (amended).
157. Bills—Linen, &c., Manufactures (Ireland).
158. Bills—Insurance on Lives (Abatement of Income Tax).
159. Bills—Turnpike Acts Continuance (Ireland).

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 23rd*, 1854.]

Dated 18th May, 1854.

1106. T. C. Hine, Nottingham—Glass chandeliers, &c.

Dated 29th May, 1854.

1190. A. E. Sablons, 4, South street, Finsbury—Portmanteaus, trunks, &c.

Dated 31st May, 1854.

1203. T. and E. Harrison, Blackburn—Looms.
1205. G. A. De Penning, Calcutta—Screw propellers.
1207. A. Rogers, Beeston Royds, near Leeds—Ventilating mines, sewers, &c., and ventilating and warming buildings.
1211. A. V. Newton, 66, Chancery lane—Soluble silicates. (A communication.)

Dated 1st June, 1854.

1213. J. Whitaker and J. Pickles, Todmorden—Preparing fibrous substances.
1215. C. King and E. S. Benfield, Chenies street—Carving machinery.
1217. J. T. Chance, Birmingham—Glass. (A communication.)
1219. J. Robinson, Carlisle—Apparatus for mixing grain.
1221. G. K. Geyelin, Camden town—Consumption of smoke.

Dated 2nd June, 1854.

1223. C. Maschwitz, Birmingham—Paring and slicing fruits and roots.
1225. E. O. W. Whitehouse, Brighton—Telegraphic communications.
1229. J. Mason and L. C. Koeffler, Rochdale—Washing wool, hairs, and yarns.

Dated 3rd June, 1854.

1231. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Fuel. (A communication.)
1233. T. Lenox, 13, Pigott street, Limehouse—Reefing sails from the deck.
1235. A. H. Leplay, Douvrin, Pas de Calais—Alcohol of beetroot, &c.
1237. W. E. Newton, 66, Chancery lane—Breech-loading fire-arms. (A communication.)
1239. A. F. Goodnow, New York—Scythe snoths. (A communication.)
1241. A. G. Barham, Bridgewater—Damping adhesive stamps or labels.

Dated 5th June, 1854.

1243. R. A. Brooman, 166, Fleet street—Screw propellers. (A communication.)
1245. G. Garbert, Port Louis, Mauritius—Construction of buildings.
1247. N. Néron, Paris—Fire-arms. (A communication.)
1249. A. Spottiswoode, New street, St. Bride's—Fuel.
1251. T. Spiller, 5, Red Lion square—Atmospheric propulsion.

Dated 6th June, 1854.

1253. W. J. Baillie, Southwark—Propelling ships.
1255. J. Nicholson, Blackwall—Ratchet screwing and drilling stock.

Dated 7th June, 1854.

1258. J. Mansfield, Stoke—Steam boilers.
1259. C. A. Perpigna, Paris—Combustion of smoke. (A communication.)
1260. W. E. Newton, 66, Chancery lane—Bonnets. (A communication.)
1261. P. Hindle, Ramsbottom—Power looms.

Dated 8th June, 1854.

1262. J. Wilson, 3, Albert place, Stratford—Pump.
1263. J. Kaye, Beeston, near Leeds—Slubbing, roving, spinning, and doubling wool.
1264. W. Alldritt, Belfast—Lighting and ventilating.
1265. M. Scott, Great George street—Roofing reservoirs.
1266. J. Leadbetter, W. Wight, and T. Davis, Halifax—Raising water.
1267. J. Skertchly, jun., Kingsland—Gates, hurdles, and fencing.
1268. P. Journet, Paris—Chucks.
1269. B. Blackburn, Clapham common—Slate pipes.
1270. T. Richardson, Newcastle on Tyne—Alum.

Dated 9th June, 1854.

1271. J. B. N. Erard, Paris—Paint.
1272. F. Margueritte, Paris—Wet gas meters.
1273. R. A. Brooman, 166, Fleet street—Brads and nails. (A communication.)
1274. J. Bramwell, Gateshead on Tyne—Carbonates and prussiates of potash and soda.
1275. J. Nelson and D. Boyd, Selby—Scutching flax and hemp.
1276. J. L. Hancock, Neath—Cutting hay and straw.
1277. J. Currie and R. Young, Glasgow—Grinding grain.
1278. B. Cook, Birmingham—Ornamenting metallic bedsteads, chairs, and couches.
1280. G. A. Buchholz, Hammersmith—Cleaning grain.

Dated 10th June, 1854.

1282. A. L. Dawson, Southwark Bridge road—Cutting and shaping wood.
1283. A. and J. Barclay, Kilmarnock—Printing textile fabrics.
1284. L. Bois, Paris—Looms.
1285. J. Whitehead, Preston—Weaving wire netting. (A communication.)
1286. E. P. Alexander, 47, Lincoln's inn fields—Moulding. (A communication.)
1287. F. Puls, Whitechapel road—Electro-galvanic apparatus.

Dated 12th June, 1854.

1288. J. Young, Wolverhampton—Locks and latches.
1289. R. A. Brooman, 166, Fleet street—Producing plans in relievo. (A communication.)
1290. R. A. Brooman, 166, Fleet street—Sugar basins. (A communication.)

Dated 13th June, 1854.

1291. A. L. Péter, Lyons—Indigo.
1292. C. H. Compton, Bloomsbury—Railway break.
1293. W. Southall, Swan lane—Cultivating land.

WEEKLY LIST OF PATENTS SEALED.

Sealed June 23rd, 1854.

2993. Joseph Lewis, of Salford—Improvements in apparatus for drilling or boring metals and other substances.
2995. Thomas Williams Makin, of Manchester—Improvements in machinery or apparatus for finishing woven fabrics.
2996. Edward Joseph Hughes, of Manchester—Improvements in sewing machines.
15. John Isaiah Grylls, 3, Murton street, Sunderland—Improvement in whelps for the barrels of capstans, windlasses, and other machinery.
61. William Littell Tizard, of Aldgate—Machinery for stamping, crushing, washing, and amalgamating gold and other ores.
121. Edmund Sharpe, of Swadlincote Potteries, near Burton-on-Trent—Improvements in the apparatus used for sifting clay.
137. Henry Bollmann Condy, of Battersea—Improvements in the manufacture of sulphate of soda, sulphate of potash, and other sulphates, and in the manufacture and employment of muriatic acid.
138. Edward Aitchison, Lieut., R.N., of 14, Manor street, Chelsea—Improvements in apparatus for fixing, removing, and plugging tubes of tubular steam boilers.
151. Herman Eugene Falk, of Gateacre House, Liverpool—Improvements in preparing or manufacturing salt.
858. Robert Whiteside, of Egremont, near Birkenhead—Improvements in treating or purifying wheat and other grain.
859. William Coltman, of High street, Leicester—Improvement in knitting frames.
894. Henry Hucks Gibbs, of 15, Bishopsgate street—Improvements in the manufacture of nitrate of soda. (A communication.)
910. Henry Brown, of Halifax—Improvements in combing wool, hair, cotton, and other fibrous materials.
923. Aimé Blavier, of the Chemin-de-fer de l'Ouest, Boulevard Mont Parnasse, 44, Paris—Improvements in locomotive engines.

Sealed June 24th, 1854.

2991. Harris Hardinge, of New York—Manufacturing liquid quartz or silex to be used in the manufacture of certain compositions for ornamental and useful purposes.

Sealed June 27th, 1854.

2999. Samuel Sedgwick and Thomas Dawson, of 186, Piccadilly—Improvements in the moderator lamp or in lamps of a similar principle.
3000. Thomas Symes Prideaux, of St. John's wood—Improvements in apparatus for regulating the supply of air to furnaces, and for preventing radiation of heat from fire-doors and other parts of the fronts of furnaces.
3007. Richard Green, of the Flint Glass Works, Brettell lane, in the county of Stafford—Improvements in insulators for insulating the wires or rods employed for conducting or transmitting electricity.
3020. Claude Alphonse Roux, of Belleville, near Paris—Improvements in printing warps of cut pile and similar fabrics.
4. James Gowans, of Edinburgh—Improvements in apparatus for heating and ventilating, and in baths and washing apparatus connected therewith, applicable to dwelling houses.
39. Anthony Bernhard Baron Von Rathen, of Wells street—Improvements in chimnies and flues of houses, and in stoves to be employed therewith, whereby better draught will be obtained, consumption of fuel will be diminished, smoke, &c., and night damp will be prevented from entering apartments, more warmth will be thrown out, and whereby fire in the chimney can be readily extinguished.
67. Felix Lieven Bauwens, of Pimlico—Improvements in treating fatty matters previous to their being employed in the manufacture of candles.
85. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in the preparation of glycerine, and in its application. (A communication.)
94. Julius Jeffreys, of 37, Carlton villas, Maida vale—Improvements in the manufacture of mineral charcoal and coke, and in adapting open grates for the combustion of them.
175. George Williams, of 16, Cannon street, St. George's-in-the East—Improvements in the construction of water-closets.
224. Benjamin O'Neale Stratford, Earl of Aldborough, of Stratford lodge, in the county of Wicklow—Improvements in aerial navigation.
270. Robert Brockman Newhouse, of Uckfield—Improved apparatus for conducting off the gases of combustion from open fire-places.
383. George Smith, junior, of Belfast—Improved machinery for retarding and stopping railway carriages.
424. William Edward Newton, of 66, Chancery Lane—Improvements in fire-arms and in projectiles.
462. James Keenan, of Paris—Improvements in forming blocks or surfaces for printing.
553. William Isaac Cookson, of Newcastle-on-Tyne—Improvements in the reduction of lead ores.
625. Thomas William Keates, of Chatham Place, Blackfriars—Improvements in the means of distilling turpentine and other resinous matters, and in manufacturing boiled or drying oils.
761. Richard Edward Hodges, of Southampton Row—Improvements in connecting wheels, drums, cylinders, and pulleys, with their naves, axes, and the parts thereof one to the other.
826. Thomas Bromley, of Liverpool—Improvements in the manufacture of soap.
859. Alfred Sohier Bolton, and Francis Seddon Bolton, both of Birmingham—New or improved method of manufacturing certain kinds of metallic tubes.
871. Henry Meyer, of Manchester—Improvements in looms for weaving.
896. William Denton, of Addingham—Improvements in combing wool and other fibres.
955. John Henry Johnson, of 47, Lincoln's Inn Fields—Improvements in revolving fire-arms.
978. John Clarke, of Leicester—Improvements in knitting machinery.
997. William Hyde Knapp, of 37, Cross Street, Islington—Improvements in the manufacture of hats and bonnets.
999. Edward Barlow, of Bolton-le-Moors, William Johnson, of Farnworth, and William Slater, and Peter Knowles, both of Bolton-le-Moors—Improvements in machinery for preparing and spinning cotton and other fibrous materials.
1005. Frank Clarke Hills, of Deptford—Improvements in the means of preventing or consuming smoke in furnaces.
1009. Joseph Wonfor, 40, Bridge Street, Blackfriars—Improvements in the manufacture of manure.
1014. Bernard Joachim La Mothe, of New York—Improvements in the construction of buildings.
1016. Bernard Joachim La Mothe, of New York—Improvements in the construction of railroad cars.
1086. Frederick East, of Warminster—Taking photographic views and portraits in the open air by means of vertible machinery attached to a cubical box, by which the changes are made, and the light and the time of exposure regulated.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
June 22.	3603	A compound Oscillating Safety Valve and Vacuum Valve for Steam Boilers	Thomas Cowburn	Manager of the Eagley Bank Foundry, near Bolton le Moors.
" 24.	3604	The Registered Crown Brace	Frederick John Jones	Addle-street, London.

Journal of the Society of Arts.

FRIDAY, JULY 7, 1854.

THE CENTENARY DINNER.

The Centenary Dinner of the Society took place on Monday, the 3rd inst., at the Crystal Palace, Sydenham, and was attended by about 750 gentlemen. His Grace the Duke of Newcastle had announced his intention to take the chair, but at the last moment was unable to do so, having to see one of his sons safe on board H.M.S. "Dauntless," which was about to start for the Baltic. Earl Granville, Vice-President of the Society, in consequence, presided. Dinner was served in a spacious banquetting hall, fitted up by the Company, on the basement floor of the building. The arrangement of this hall was such as to permit of a distribution of the company in somewhat of a classified order, with the view of showing that it was not an ordinary mixed assemblage. At a large semicircular upper table, embracing the length and breadth of the hall, were arranged, on either side of the Chair, the Foreign Commissioners to the Educational Exhibition, and other distinguished guests, invited by the Society to be present, including the Directors of the Crystal Palace Company. Among those seated at this table were, the Lord Mayor, the Earl of Harrowby, Viscount Mahon, Viscount Ebrington, M. Milne Edwards, F.R.S., Membre de l'Institut, Doyen de la Faculté des Sciences, Commissioner from France; the Hon. H. Barnard, Superintendent of State Schools, Connecticut, U.S., Commissioner from the United States; Mr. Charles Fogh, Commissioner from Denmark; Dr. Siljestrom, Director of the New Elementary School in Stockholm, Commissioner from Sweden; Dr. Thomas Krag, Theologiæ Candidatus of the University of Christiana, Commissioner from Norway; M. Schmidt, Director of Tankske Realskole, in Bergen; the Rev. Dr. Carl Heinemann, Rector of the Mercantile Academy, Gothenburg; Major Oliphant, Chairman of the East India Company; Mr. Samuel Laing, M.P., Chairman of the Crystal Palace Company; Mr. Fuller, Managing Director; Mr. W. Anderson; Mr. T. N. Farquhar; Sir C. Barry, R.A.; Sir W. Cubitt; Mr. R. A. Slaney; Mr. Harry Chester, Chairman of Council; the President of the College of Surgeons; Sir W. C. Trevelyan, Bart.; Captain Laws, R.N.; General Thomas, (U.S.); Judge Upham, (U.S.); Mr. C. F. Stansbury; Mr. Willich; Mr. A. Elliott Lockhart, M.P.; Mr. Peto, M.P.; Sir T. Phillips; M. O. Delepierre; Mr. C. Wentworth Dilke; Mr. Charles Knight; Mr. Gilbart, F.R.S.; Mr. T. Webster, F.R.S.; Mr. N. Montefiore; Mr. Booker, M.P.; Mr. W. S. Portal; the Mayor of Oxford; the Mayor of Derby; Rev. Dr. Major; Rev. J. R. Major, M.A.; Mr. Oliveira, M.P.; Mr. Whatman, M.P.; Mr. Alderman Saddington; Mr. Alderman and Sheriff Wire; Mr. Under-Sheriff Anderton; Mr. Lambert Jones; Mr. T. Dyke Acland; Dr. Michell, M.P.; Mr. Mechi, &c., &c.

At 13 parallel tables, embraced within the semicircular one, were seated the Members of the Society, the Representatives of the Institutions in Union, and their friends. The Council occupied the centre table, with the exception of Mr. Harry Chester, the Chairman, who sat on the left hand of Earl Granville. At this table were Messrs. W. Bird, H. Cole, C.B., Warren De la Rue, F.R.S., W. F. Harrison, P. Graham, J. C. Macdonald, Matthew Marshall, W. Wilson Saunders, F.R.S., S. Redgrave, T. Twining, jun. Lieut. Col. F. Eardley-Wilmot, R.A., T. Winkworth, Don Manuel de Ysasi, &c., with the Rev. Dr. Booth, F.R.S., as Vice-Chairman.

At the Art table, on the left of that occupied by the Council, were seated, among others, Messrs. David Roberts, R.A., W. Tite, Decimus Burton, F.R.S., Digby Wyatt, Owen Jones, Dennis Chantrell, Roger Fenton, S. Mair, P. W. Fry, with Sir Charles L. Eastlake, President of the Royal Academy, as Vice-Chairman.

At the Commerce table, next on the left, were, among others, Messrs. John Dillon, W. Hawes, F. Bennoch, J. E. Carlile, G. Cottam, J. Darlington, J. Gray, W. P. Hammond, S. Morley, J. Morley, J. A. Nicholay, S. Waterhouse, with Mr. W. Brown, M.P., as Vice-Chairman.

At the Institutes table, next on the left, were, among many others, Messrs. Paul Blackmore, J. C. Buckmaster, G. Dawson, C. Griffin, J. R. Kay, Rev. H. Hawkes, J. Hole, Rev. Gerald Lermit, J. Morrison, T. Riching, J. Sillifant, T. Woollcombe, Rev. W. Yate, with Mr. E. Baines as Vice-Chairman.

At the Science table, which was that immediately to the right of the Council table, were seated, among others, Dr. T. K. Chambers, Dr. Farr, Mr. J. Glaisher, F.R.S., Dr. Guy, Mr. Thomas Huxley, F.R.S., Dr. Latham, F.R.S., Mr. J. Simon, F.R.S., Dr. Stone, Professor John Wilson, with Dr. Forbes Royle, F.R.S., as Vice-Chairman.

At the Engineering table, next on the right, were, among others, Sir John Rennie, F.R.S., Sir Charles Fox, Messrs. Geo. Lowe, F.R.S., J. Hawkshaw, J. G. Appold, F.R.S., John Braithwaite, Charles Manby, F.R.S., E. Woods, Herbert Mackworth, W. Bridges Adams, C. W. Siemens, H. Hensman, with Mr. Robert Stephenson, M.P., Vice-President of the Society, as Vice-Chairman.

At the Education table, the next on the right, were the Dean of Salisbury, Archdeacon Lane Freer, the Hon. and Rev. S. Best, Messrs. M. Arnold, Rev. Harry Baber, —Cory, T. W. Allies, Maurice Cross, H. Dunn, Rev. I. G. C. Fussell,

John Hullah, Rev. J. G. Lonsdale, Rev. H. Mackenzie, Rev. Muirhead Mitchell, Rev. G. R. Moncrieff, Rev. E. D. Tinling, Rev. A. Rigg, Joseph Ruddock, F. R. Sandford, D. Stow, —Sykes, Jacob Waley, Rev. F. Watkins, &c., &c., with the Dean of Hereford, Vice-President of the Society, as Vice-Chairman.

At the Manufacturers' table, the next on the right, were Messrs. W. Barber, G. Courtauld, R. Dawbarn, I. Foster, G. Hairs, S. M. Hubert, G. T. Kemp, A. Lapworth, J. R. Lavanchy, W. Longmaid, Herbert Minton, C. A. Preller, G. F. White, G. F. Wilson, &c., &c., with Mr. Thomas De la Rue as Vice-Chairman.

After dinner, The Very Rev. The Dean of Hereford having said grace,

The CHAIRMAN rose and said—My lords and gentlemen, the absence of his Grace the Duke of Newcastle having already become known to you, I may be allowed to state why he is not here to-day. His Grace suddenly received notice that this was the last day on which his youngest son could go on board the "Dauntless," about to sail for the Baltic. Any one, more particularly a father, can scarcely reflect on the service in which that youth is about to engage (a service in which the electric telegraph has to-day informed us, a young boy has been enabled to save the lives of his comrades by his gallantry and skill), without feeling that the Duke of Newcastle, however deeply we may regret his absence, has a valid and sufficient excuse for not being present on this occasion—though I could have wished that he had a more able substitute in this chair. My first duty is now to propose a toast which requires no preparatory observations from me to insure its cordial acceptance, the health of the illustrious lady whom we have the happiness to possess as sovereign of this country. I remember, about two years ago, hearing a soldier and statesman, a subject of a northern power, in speaking of the constitution of Great Britain, state, that he could not understand how it was maintained, as it appeared to him like a boat continually rocking from one side to the other; upon which I took occasion to remark, that that circumstance most probably accounted for the difficulty which existed of upsetting the boat. (Laughter.) Of this I am sure, that her Majesty holds the affections of her people, alike by her public and private virtues, which give strength and stability to the throne, and that it would be difficult to find a constitution under which those virtues could be more fully or more assuredly appreciated.

The toast having been drunk, the CHAIRMAN said—My lords and gentlemen, the next toast which I have the honour to set before you is the health of H.R.H. Prince Albert. I am aware that that toast is always received with pleasure, but it obtains a peculiar significance on the present occasion, inasmuch as H.R.H. Prince Albert is the President of the Society whose Centenary we are now assembled to celebrate. I am sure that the toast will be received with every mark of respect and regard, which will be increased when it is considered how greatly his Royal Highness's connection with this Society has proved advantageous to Science and Art. I believe H.R.H's connection with this Society, as its President, has proved most useful both to his Royal Highness and to the Society. The Society of Arts has materially assisted his Royal Highness in carrying out those noble propositions which he has brought forward in support of Art, whilst I believe the Society has received great advantages from the combination of talent and position which his Royal Highness has brought to bear in support of an Institution in which, from his love of Art and Science, he has taken so great and lively an interest, and whose motives for the furtherance of his views he has so well appreciated.

The toast having been drunk,

The CHAIRMAN said, the next toast I have to propose to the company is the health of H.R.H. Albert, Prince of Wales, and the rest of the Royal Family. I cannot help thinking that the encouragement which her Majesty and Prince Albert have given to the magnificent enterprise of the Crystal Palace Company, must prove advantageous to the Prince of Wales and the other branches of the Royal Family in their future studies. My great wish is to see all the members of the Royal Family supporting the arts which add grace to society, from other than personal motives, and I think that the sympathy which the illustrious parents of the youthful branches of the Royal Family have shown in this undertaking, and the encouragement they have afforded to every branch of arts and manufactures, cannot have any but a beneficial effect on their future character and pursuits. They cannot fail to perceive with what great respect her Majesty is always received, and how rightly she has found her way to the hearts of the people—how greatly she is enabled to advantage the people without looking to anything beyond their affections to support her power. I have no doubt that the education of the youthful members of the Royal Family will be properly attended to; and I am sure that it must be improved by the opportunities they have of witnessing the example of their illustrious parents. The toast having been loyally received,

Mr. HARRY CHESTER rose and said—My Lord Granville and Gentlemen,—As Chairman of the Council of this Society, I have been requested by my colleagues to propose a toast, and, at your lordship's suggestion, I take it somewhat out of the appointed order; but there is a peculiarity about it which justifies the deviation, more especially as the way has been paved by something your lordship just now said. Upon ordinary occasions, those who visit this remarkable building come here as visitors and guests of the Crystal Palace Company; upon this occasion, however, we are here in a somewhat peculiar character—being in one sense the guests, and in another sense the hosts of the directors of the Crystal Palace Company. I have, my lord and gentlemen, to request you to drink "Success to the Crystal Palace Company"—(cheers)—and I will blend with that the health of the chairman of that company, Mr. Laing. (Cheers.) I take it the members of the Society of Arts are, generally speaking, persons having a lively and personal interest in arts, manufacture, commerce, and education, and no one who has any special and real interest in these objects can fail to feel a deep interest in the success of the Crystal Palace. (Hear, hear.) I will not say it is the Palace—I would rather say it is the happy and natural home of arts, manufactures, commerce, and education. (Cheers.) I now simply ask you to drink this toast, and coupled with it the health of Mr. Laing, a gentleman who, I am sure, has exerted himself, and will continue to exert himself, to provide for the recreation and instruction of the visitors to this wonderful structure, as well as for the profit of those public-spirited individuals by whose means the innumerable works of art with which the building is enriched have been collected together. I give you, my lord and gentlemen, "Success to the Crystal Palace Company, and the Health of its Chairman, Mr. Samuel Laing." (Protracted cheering.)

Mr. S. LAING, M.P., in replying to the toast, said—My lords and gentlemen, I assure you that I regret exceedingly that the absence of my friend, Sir Joseph Paxton, whose name is so much more appropriately associated with this noble undertaking, should make it incumbent on me to reply to the present toast. I feel surprised, on my part, that my name should be put in connection with the toast, because the popular sentiment has so connected his name with the enterprise of the Crystal Palace, that I confess that it is with a feeling of disappointment that I now get on my legs to address you, and that I do not see Sir Joseph in his proper place. That absence I regret exceedingly on the present occasion, because it is obviou

that, associated as he is in the eyes of the nation with the Crystal Palace, he would more properly than myself welcome beneath its crystal dome that parent society, the Society of Arts, to which we are so deeply indebted. (Cheers.) I think that there is another reason why we should be exceedingly glad to hail and welcome here the Society of Arts. It is evident that if the Crystal Palace is to carry out those objects for which it has been designed, it must be associated with the education and advancement of the people of England. We have practically to carry out the Horatian maxim, and mix the *utile* with the *dulce*. (Hear, hear.) So far as regards the agreeable part of the undertaking, there can be no doubt but we have succeeded in creating an agreeable place of resort for the people of London. There can be no doubt, at all events, that those now above stairs are enjoying a large amount of useful and harmless instruction. There is again no doubt that the edifice is every day more and more becoming an essential part of the existence of the people of London—a most agreeable lounge, in which many of our habits will be most materially modified by contact with some of the most beautiful works of art. (Cheers.) It is, in fact, an approximation to the most agreeable part of a continental existence, presenting to us, as it does, all that is most beautiful in nature, and most surpassing in art; objects on which we may continue to gaze undisturbed by the inclemency of the weather. I am not disposed to underrate the educational advances which may be made by the masses of the population in such scenes, where they may walk about peaceably and quietly, surrounded by the most instructive sights, both as regards nature and art. We are, however, more ambitious—we look to it as a means of direct education; but to attain that end we must trust to the co-operation of societies of this description, and to that of the gentlemen who come here to represent them. If we were to attempt to take into our own hands the pedagogues ferula, and say to the multitude, "You must not amuse yourselves as you please, but must listen to the lectures we may deliver to you," I believe that we should only make ourselves extremely ridiculous. (Hear, hear.) But if, on the other hand, gentlemen like those whom I see around me, looking to the great and important objects which we have in view, will themselves take the thing in hand and organize lectures and other means of instruction, then a great deal of good may result to education—greater indeed than any of us could hope to obtain by his own unaided exertions. I do, therefore, trust that our connection with the Society of Arts, from whose loins I may say we have sprung, may be the means of promoting co-operation between us in our endeavours for the same object. I can now only return you on my own part, and on that of the Crystal Palace Company, our most sincere thanks for the honour which you have done us, and I hope that the Crystal Palace, sprung from the Society of Arts, many turn out to be an institution of which the more ancient and parent society may never have reason to be ashamed. (Cheers.)

The Noble CHAIRMAN then rose and said—Gentlemen, the toast which I have now to propose to you is that of the "Society for the Encouragement of Arts, Manufactures, and Commerce." (Cheers.) The only thing which I have to consider in proposing, and you in accepting, the toast, is, whether the objects of this society are desirable in themselves, and whether the attempts to carry out those objects have been successful or not. With regard to the objects, I really should have imagined that there could have been no doubt upon the subject. (Hear.) But it having happened that, within a very short time, two of the most intellectual and highly cultivated members of the Legislature—one in each house—have thrown some disparagement upon the necessity of elementary education, and the use of trying to instil art and science amongst the masses of the people, I must appeal to you for a few moments on this subject. For my own part, I cannot help thinking that it is a proof of the overwhelming confidence which such highly cultivated minds feel in themselves when they indulge in what appears to me such a perfect fallacy. (Loud cheers.) I maintain that here is represented pretty well the sense of this country. Amongst us there are some of the most distinguished representatives of the intelligence of some of the most highly civilised countries of the world. (Hear, hear.) If any one of the 750 gentlemen who are here present is inclined to take the line of argument which I have just distinguished, I will undertake to argue it with him, and I would do so not from any confidence in my own abilities, but because I believe that, however inferior the understanding of one man may be to another's, if they take up an argument upon a proposition of Euclid, the one who argues against that proposition in the long run must get the worst of it. (Laughter and cheers.) My challenge does not seem to be accepted. I therefore presume you agree with me that the object of this society is a desirable one. (Loud cheers.) With regard to the means of carrying it out, I have read—as I dare say the large majority of the gentlemen here have read—the admirable address which was read by my friend the chairman of the Council, giving some interesting accounts of the history and progress of the Society. I do not mean to go over that history again, because, although many persons have a maxim that if they hear a good story, you have a right to repeat that story as long as there is any one person in the society who has not heard it—(laughter)—yet, I believe, the adoption of that rule is somewhat dangerous for any one who wishes to be listened to again. I think, however, it is impossible for any one to have heard that address, or who may read it, not to be struck with the manner in which this Society has gone on from small beginnings to a great result—(hear, hear)—how it has, from the almost exclusive attention and interest of the higher classes, come to be regarded with deep interest by the middle and even lower classes of society. Their efforts have not been confined merely to national objects; and the Exhibitions which they were the first to begin, have grown from one thing to another until we come to the Exhibition of 1851, and have consumated this marvellous building at the present moment. (Hear, hear.) I cannot help thinking that the Educational Exhibition which is now intended to be reopened, and which has been owing to the untiring efforts of the Council of this Society, aided by one or two other gentlemen—will have the most beneficial effect, not only as giving information respecting education in this and in other countries, but as bringing the attention of the public mind still more to the subject. I am one of those who think that immense progress has been made both in elementary instruction and in the necessity which all classes of English society feel for a greater admixture of instruction in manufactures and science than has hitherto prevailed. I believe by the efforts of the State, by the efforts of public bodies—both of laymen and of religious bodies—and, I may add, by the efforts of individuals whom I could name—and I should like to particularise them if they were not present—immense assistance has been given to the cause of education in this country. The mode of imparting education has been immensely forwarded and improved. A race of teachers utterly unknown a few years ago has been created. Without referring more in detail to anything which has lately been done by the Government, I believe that the regulations which have been adopted within the last year will, within a very few years, show their result in a very largely increased measure of instruction, both in science and in art, being given in the elementary schools in this country. (Hear, hear.) But when I have said this, so far from being proud of the progress we have made, I feel that there is a lamentable deficiency when we compare the state of education with the power and resources of this great nation. (Hear, hear.) Plans have been suggested—many of which, I believe, would work very well if all persons would combine in carrying them out—but it is use-

less either for Government or any other body of men to force down conscientious objections to any particular plans, when those conscientious objections are founded on political or religious feelings. (Hear, hear.) I think we must for the moment, and only for the moment, be satisfied with pushing education through every possible avenue that we can find for it. Now, I think that the Society of Arts, in its forthcoming Exhibition, is likely to be most useful for this purpose. This Society numbers amongst its members some of the most distinguished men in every line of life that we have in this country, and yet I do not value the Society so highly for having pushed any particular branch of science, as on account of its universality and its versatility in shaping itself to the wants and feelings of the present age. (Cheers.) As a body, they are a rough and ready, bustling community—(laughter)—they are constantly pushing themselves into corners where I really believe they have no business to go at all—(renewed laughter)—and where, if the Government attempted to follow, nothing but the most irretrievable confusion and ruin would be produced. I had myself grave doubts of the expediency of a society like this mixing itself up with that most difficult question—strikes and lock-outs—but I believe the conference which took place on that subject has resulted most usefully; not only in the discussion of it; but the attacks that were made upon the society for having embarked upon that topic have, as forcibly as anything could do, brought before the minds, both of workmen and employers, the real grounds upon which that most difficult question rests. (Cheers.) There is another exhibition to be opened in a neighbouring country, in which the most liberal conditions are proposed to the British exhibitors. The Society of Arts took upon itself to suggest certain modifications, which were adopted with the utmost liberality by the French Government; so that there can be no doubt that the Exhibition at Paris will be a highly successful one in every respect. Another thing it has done. It has circulated a proposal amongst local bodies in different districts, who, it has been suggested, should establish themselves as treasurers to take care of the savings of those working men who may wish to visit Paris when this Exhibition takes place. (Hear, hear.) I look forward to this result as one of the greatest use in opening the minds of the working classes in this country, and as highly calculated to aid in cementing still further the union which now so happily subsists between the two nations. (Hear, hear.) As one of the Commissioners of the Exhibition of 1851, I do not wish to be supposed to attribute results which may not justly be traced to that Exhibition; but I cannot help remembering some of the circumstances which attended that Exhibition—the intermixture of foreign with English workmen, the intermixture of foreign and English exhibitors, the singular probity and honour which characterised the awards of the jurors—and, without being considered invidious, I may particularly mention those from the neighbouring country, as they formed the greater number. Seeing the Lord Mayor here as the representative of the fine old historic corporation of the City of London—(laughter and cheers) that corporation of which we have so many historic recollections, and which on a memorable occasion stood forward as the defender of the liberties of the country—I cannot help remembering that in 1851 that corporation betook itself to foreign travel—(a laugh)—a part of its education which had been much neglected in its early years. (Renewed laughter.) I cannot but think that all these different incidents—some more and some less—have led to that good feeling, that removal of prejudices which formerly existed between the two countries—(hear, hear,)—and to the fact that the people of both nations unanimously supported their respective governments through a most difficult and protracted politi-cal negotiation. (Cheers.) And I think some small influence of the same sort may have been exerted in producing that cordial feeling which exists between the combined armies and the fleets of the two nations, which have exhibited nothing but the most generous rivalry and anxiety to be distinguished in company with each other, in defence of what both consider the just rights of civilisation, and the interests of Europe. (Hear, hear.) To such extent is this feeling carried, that when the French sailor wishes to compliment the English sailor, not being able to find words to express himself as he could wish in our language, he slaps him on the back, and cries —"Bravo, Jackey." (Loud laughter.) Having made allusion to the representatives of foreign nations, I am afraid it is an idea infixed in their minds that we Englishmen are not able to do anything good or bad without eating and drinking; but, considering the "post-diluvian" times in which we live, I think for a society of this sort to eat and drink once in a hundred years, is not very formidable. (A laugh.) I am afraid there are few of us who will remain to witness another celebration of this sort at the end of another century. Requesting your indulgence for having detained you so long, I now ask you most cordially to drink the toast of the Society of Arts, to join with me in wishing that it may continue the course of usefulness which it has hitherto pursued, and that, by its future exertions, it may confer immense benefits, not only upon the population of this country, but upon the people of the whole world. The noble chairman then gave the toast, "The Society for the Encouragement of Arts, Manufactures, and Commerce," coupling with it the names of Sir C. Eastlake for the Fine and Industrial Arts, Mr. John Dillon for Manufactures, and the Lord Mayor for Commerce.

Sir Charles Eastlake first replied to the toast, and said, My lords and gentlemen,—On the part of the artists allow me to acknowledge the honour you have just done us in that part of the toast which belongs to us, and sincerely to hope that as the Society of Arts has, by its unaided exertions, achieved for itself the high character it enjoys, its views of thinking and its recent undertakings may have the effect of expanding the circle of its operations, which have hitherto been somewhat too circumscribed. It becomes us, the artists of this country, not to be unmindful of this, the parent society of the Royal Academy. (Cheers.) It is possible that there may be some artists present, now advanced in life, whose early ambition was stimulated by the rewards of this Society. I may answer for myself, and say that some years ago (I forget the precise time since elapsed) I had the honour to receive the Gold Medal of the Society from the hands of the late Duke of Norfolk. That was a stimulus to me. (Cheers.) Artists, too, have derived much valuable information from the voluminous publications of the Society, and I hope that the aid it has given to the Fine Arts during the past century may be, in the course of the coming one, still greater, so that when it meets again, at the next centenary festival, it may be with feelings of satisfaction and cordiality as strong as we now experience. Again, my lords and gentlemen, allow me to return you our very sincere and warm thanks.

Mr. Dillon said—My lords and gentlemen, I have been ask d to return thanks for the toast on the part of the manufacturers. At first I declined the office, on the ground that I am not myself a manufacturer, but when I recollected that, although years since, there were those who supposed that manufactures and commerce were adverse interests, they had now come to be considered one and the same, so that the prosperity of the manufacturer is mixed up together with that of the trader, and when I remember that their prosperity is accompanied by that of the public at large —is not confined to this our own island, but extends to all those with whom we have communications, I was encouraged to address you on the part of the manufacturers, and to return you their hearty thanks. One word, and only one more. It is impossible to speak of the Society of Arts without recollecting all the improvements which it has originated in those branches which it

was formed to promote, and without wishing for some Barry to paint the results to our country and to our nation, more beautifully than he has depicted the effects of general prosperity in those pictures which decorate the hall in the Adelphi. I was in the same room when, as you were told by the President of the Royal Academy, the late Duke of Norfolk presented to him the Gold Medal of the Society. I have, in fact, watched the course of the Society from small beginnings, as it took its grand steps towards the general diffusion of knowledge, and I, therefore, think that to the Society for the Encouragement of Arts, Manufactures, and Commerce, the educational world owes much. I cannot but think that the last report which it has made ought to be considered as an event in the natural course and progress of society at large. Combined in such Societies we prosper together, or we fail together. And when I look around me I see the auguries of future success, for it is with pride that I behold such an assembly brought together in connection with the Society of Arts. (Cheers.)

The Lord Mayor, in replying on the part of commerce, said, my lords and gentlemen, I had indulged the hope that at the present feast of reason, I might have been allowed to remain a silent spectator, and not be called upon to be an active contributor; but I suppose it is because that I am connected with the first commercial city in the world, that my name has been associated with the toast. I cannot but imagine that commerce is the great pioneer of civilization, although, as has been most fairly stated, manufactures show a more advanced state. Yet we must wish well to commerce. It existed centuries before manufactures, which were, nevertheless, named before it in the toast, and may be supposed to be the great key-stone of the arch of civilization. (Cheers.) There is, however, another reason why I should be called upon to reply to the toast, and that is, from the fact of my following those commercial undertakings in the pursuit of which I have been brought up, for I am not ashamed to confess that I have gained everything that I possess from following the paths of a commercial life. (Cheers.) I might here end any observations that I have to make, but that you, my lord, have alluded to the recent Continental travels of the corporation of the city of London, and I agree with you, that the greatest results have taken place from such travels. It is only 12 months since that the corporation was beginning to have a taste for such scientific pursuits as were then acting on the wood of the tables of our country, and the city of London had Gog and Magog busy "turning the tables." (Laughter.) I will, however, say, that it affords us the highest gratification to find, that all projects for education are coupled with such lively sentiments for the prosperity of the commercial interests of the country, and I hope that the connexion between commerce and education may be continually strengthened. I again beg to return you thanks for the great honour you have done me. (Loud cheers.)

Mr. Charles Knight then rose and said—My lords and gentlemen, I regret very much that it has fallen to my lot to propose the next toast, as I feel that that duty, though imposed on me by your lordship's command, would have been "more honoured in the breach than the observance;" nevertheless I will do my best to discharge the duty which devolves upon me. I am requested to propose the 355 Institutions in Union with the Society of Arts. I am quite sure that, next in importance to the toast of the Society of Arts itself, is that which I now propose for your adoption, and I, therefore, feel singularly honoured in being allowed to do so. For when I consider that these Institutions represent, more or less, the progress of education in this country, when I know that in this room there are present a vast number of gentlemen who are representatives from the Institutions in Union with the parent Society, and that they have come to join in the magnificent festival which has attracted everyone here to-day, you will feel with me that the mere occasion of our being allowed to be present is a great fact as connected with the cause of education in this country. (Cheers.) I am not particularly conversant with the modes of action which govern the local Institutions thus brought into co-operation with this Society; but this I do know, that the principle of co-operation is to give effect to the value of those local Institutions, and this Society has afforded those means, and in so doing, has extended its own fame and its sphere of usefulness. As I heard Mr. Chester say, manufactures, commerce, and education should be the title on its doors. My lord, no one, I think, can regret the absence of the Duke of Newcastle this day when we have had the happiness to sit under the presidency of your lordship—(hear)—but I think it would have been an important augury for the future of this country had the War Minister presided on this occasion. I should think, too, it would have been gratifying, not only to his grace, but to that government of which his grace, and you, my lord, are members. Any one who considers the past history of this country, must know that during many years of bloodshed and all those trials which accompanied them, the cause of education was neglected. It was only when peace came that we were enabled to cultivate the education of the great masses of the people, and that Mechanics' Institutions sprang up. I have watched the progress of these great aids in the cause. I remember that they were not known some thirty years ago, whereas now there are 355 actually in union with this Society. Those gentlemen who are here to-day, and who represent these Institutions, will see that it is of the greatest importance in the time of warfare that, whatever the destinies of the country may be, they should maintain a constant and unvarying progress, whereby they will confer the greatest blessings, not only on this but on successive generations. I have now to propose the 355 Institutions in Union with the Society of Arts.

Mr. Edward Baines—My lords and gentlemen, I have the honour, at your command, to return thanks on behalf of those who sit at this table, and who are the representatives from the Mechanics' Institutions in connection with the Society of Arts. I may state that I have one qualification for undertaking the task which has been allotted me, namely, that I have witnessed the rise and progress of these interesting and important Societies. Exactly thirty years ago, I attended a lecture at the first, and then the only, Mechanics' Institution in England. It was held in an old and dirty chapel, near Falcon-square. I have lived to witness such an assemblage as this in this splendid palace! I have lived to see 800 Institutions of this nature, the representatives of which are gathered together in a building unequalled in all times. (Cheers.) The Society of Arts boasts this day of the 100th year of its existence: and it is a remarkable fact that that period has witnessed the greatest discoveries and improvements in art, science, and manufactures ever known in the history of the world. But during two-thirds of that period, the larger portion of the population was not called upon to take part in the national advancement. For a long period it had been supposed that men were required only to be mere labourers, unacquainted with Art. Dr. Birkbeck first addressed the mechanics at Glasgow on the Principles of Art, and we now see 800 Institutions in existence in this country, and 1057 Philosophical and Literary Societies and Mechanics' Institutions. Connected with the Yorkshire Union, we have 130 Institutions, comprising 20,000 members. Whilst in one sense we ought to seek to raise the character of our Institutions, in another sense we are seeking to bring them down to the humblest class of society. Our object is to bring them down not merely to the towns in which large Mechanics' Institutions exist, but to the smallest villages. And I must here observe that one great improvement which has been made has been the formation of itinerating village libraries. We seek to form libraries where we cannot at present attempt to do anything greater, and we hope to embody the feeling of the country in the cause. When we talk of Mechanics' Institutions we beg to thank the Society of Arts

and the Crystal Palace Company. We think we owe much to them, and I think they owe much to Mechanics' Institutions. I do think that but for Mechanics' Institutions, neither the Great Exhibition of 1851 nor this Crystal Palace would have been raised. My lords and gentlemen, I beg to return you thanks on my own behalf and that of the other representatives present.

Lord Mahon said,—My lords and gentlemen,—I have been requested to propose as a toast the health of those foreign gentlemen who have been deputed by their governments to take part in your Educational Exhibition. I am sure you will feel with me how great is the honour conferred upon this Society by the presence of the gentlemen who have been deputed from foreign countries to take part in our proceedings; and, whilst we do ourselves the honour to drink to the health of those gentlemen whom I have the pleasure to see around me, allow me to recollect that the noble lord in the chair has himself performed the duties of a Commissioner, in a manner to command the respect and admiration of all who had the honour to come in contact with him. (Cheers.) It will be recollected that, in reply to the toast of the Exhibition Commissioners to foreign countries, given at an entertainment to which they were invited by our neighbours, he delivered a speech in a language not his own, which created a marked sensation, and I have no doubt that that speech will, as it ought, ever be remembered. I think, therefore, it is with peculiar appropriateness that the chair is this day filled by the noble lord. I desire to connect with the toast which I have to propose the eminent man who is present as the Commissioner from France, Mons. Milne Edwards, and on the part of our brothers of America, the Hon. Henry Barnard, of Connecticut. I call upon you, gentlemen, to drink to the toast of the Foreign Commissioners to the Educational Exhibition of the Society of Arts, and, more especially, to the two gentlemen whose names I have mentioned.

M. Milne Edwards, who spoke in English with remarkable facility, said—My lords and gentlemen, France cannot but feel deeply animated by the generous and enlightened sentiments which have actuated the promoters of knowledge assembled in this aerial castle. I beg leave to state, on behalf of France, and on behalf of the Emperor, by whom I have been deputed to visit this country, that he feels the deepest and warmest interest in your labours in the cause of education. (Cheers.) Education, as a noble lord present has informed us, was formerly bestowed only on the happy few, but now it is diffused throughout society at large, and it forms the most powerful, generous, and Christian feature of the present age, that education is so extended from the highest to the lowest. France has long been desirous of instilling into the minds of all her citizens those elementary notions of science, literature, and art, which you protect in a most especial way, by means appropriate to the spirit and habits of people. Considerable progress has now been made in that direction, and England, with the vigour, perseverance, and practical good sense which are so characteristic of her people, has been no less happy in the efforts which she has made to diffuse useful knowledge amongst every class of society, at home and throughout the world at large. The combined efforts of the two nations thus to extend everything which is really useful to the minds as well as to the souls of men, must be pleasing to all well-gifted hearts. (Cheers.) The two nations, who for ages have caused so much blood to be shed uselessly, leading to the infliction of so much misery upon mankind, are now rivals no longer as slaughterers on the field of battle, but only as the teachers of the human mind. I said rivals, but that word will by no means correctly express my meaning. Rivalry is a term which generally implies something like jealousy; some wish to obtain an exclusive possession or advantage, whilst in the peaceful career on which the two nations have now entered, every conquest made by the one or the other will tend to the equal profit of both. (Loud cheers.) It is, therefore, my lords and gentlemen, with most grateful feelings, that in the name of France, and in the name, I will say, if I am not encroaching too much upon the privileges of other foreigners present, of civilisation at large, that I thank you for the great efforts which the Society of Arts has made, and the kind reception which has been granted here to foreigners. In the work of civilisation, England and France, united as they now are, need fear no rivals; and in history I can find no period in which such powerful and successful efforts have been made for the promotion of knowledge. Our great predecessors in civilisation, the Romans, had but a slight influence over mankind, compared with that which is now actually in the hands of England and France. The steamers of our countries, like the radii of the glory which crowns the two nations, are steering in all directions, and carrying our examples to the most distant shores. (Loud cheers.) Our predecessors, the Romans, quailed and fell before the invading hordes of Scythian barbarians, but England and France, in the present time, will be more fortunate. (Continued cheering.) Now, my lord, you must allow me to make once more to the English people my grateful thanks for the kind reception which has greeted the foreign visitors. [The hon. gentleman resumed his seat amidst loud cheers.]

The Hon. Henry Barnard, of Connecticut (U.S.), also responded to the toast. He said,—Had not the mover of the toast which you have received so kindly taken the precaution to introduce me here with my colleagues as a foreigner, and as the representative of a distant country, I should have felt prompted, by the remembrance of the many hospitalities which I have received already in this country, and looking around as I do upon faces so familiar, and those who seem to me to be the representatives of the British race, to have commenced with addressing you as "my fellow-citizens." (Loud cheers.) And I at first thought, when I found my name coupled here with that of the representative of our ancient ally—of France—that he was about to propose here, on the eve of the 4th July, a grand international union. (Hear, hear.) Surely it is more pleasing to me to be present in this great popular school of education and recreation—to find myself surrounded here by the ministers of peace instead of the ministers of war—to find myself looking around on fields smiling in beauty, instead of fields ploughed up by the mad wheels of artillery—and to listen to kind and cordial greetings, instead of the shouts of the battle or the groans of the dying. Surely we may feel that "peace hath her victories and triumphs" no less than war; but, my lords and gentlemen, I do not propose now to make a 4th of July oration. I beg to return you my thanks on behalf of the small state which I represent here, as forming a portion of the great confederation of American states, and to thank you for your cordial greetings. Whatever may belong to the past history of my native state in the eyes of our own nation, we feel that we are indebted to the fact that the early settlers in Connecticut were graduates of the grammar schools and universities of this country, and that we owe it to that fact, that there was incorporated into the first code of her laws this simple provision (and if there is ever to be a monument erected, and an inscription placed upon it, I trust it may be the words of that law)—"That the authorities of the towns would not allow so much barbarism to exist in their midst, as to have a single child unable to read the Holy Word of God and the good laws of his country!" (Hear, hear, and cheers.) My lord, as the humble representative of that state, I may say with some feeling of pride, that for the last 50 years there has not been found a single born native of Connecticut who could not write his name and read the laws of his country. (Hear, hear.) But I will not detain the assembly at this hour of evening. It is a peculiar pleasure to me, who am not an entire stranger in your country, for I have been cordially received in many of your homes,

and I trust I have not left any of your doors ajar—(hear, hear)—it is a more peculiar pleasure to me to come here again on this occasion, after an interval of 20 years, and to find such undeniable marks of progress as I have seen during the last three weeks that I have been in this country. And, although my own state and other American states will not make large additions to the Exhibition which is about to be opened under the auspices of this Society—owing to the notice having reached so few of them—owing also perhaps to the fact that education with us is entirely a State affair, and not a national affair;—although I say owing to these facts our contributions to your Exhibition will be small, yet I have already seen enough of the contributions made by other countries, and by your own schools, to feel that I shall carry away with me very important lessons, which I trust will be felt in the schools of my own state and my own country. Permit me, gentlemen, now to give you as a toast—"Success to the Educational Exhibition."—(Much applause.)

The Earl of Harrowby said—I think I heard it suggested in the far end of the room, that "time was up;" I believe it is up, and happily for me it is so. It therefore gives me the suggestion that I am to be short in what I have to say to you; and yet I could not be short if I were to detail to you all connected with the toast which I have to offer to you; I have to give you the health of our noble chairman, Earl Granville. (Loud cheers.) I am not sure that in giving you the toast I have not said all that can be required to recommend it to you. His is a name of the most practical significance, considering the part he took in the project of the Great Exhibition, and the way in which he presided over the council of that noble and popular undertaking. You, yourselves, gentlemen, have just heard the versatility with which he can pass from the gravest to the gayest subjects, touching and adorning each topic. With these few observations I beg leave to propose the health of our noble chairman, Earl Granville. (Loud cheers.)

Earl Granville then said—Gentlemen, I beg leave to return to you my most sincere thanks for the kind feeling with which you have received the toast of my name. I am grateful, too, to my noble friend, for suppressing three facts—first, that he is one of my nearest relatives; secondly, that he is one of my earliest friends; and, thirdly, that he owes me a great debt. (Cheers and laughter.) For the great regard that I entertain for him, I do not wish to diminish the value of the compliment by showing that I want so much sense as to tax you with a fifth speech, as I have already made four. I should however, before I sit down, like to say something about the Crystal Palace. I do not want to speak of the liberality which has characterised the undertaking, but to compliment the Company upon an example they have set us, which is this, that the shortness of the dinner and speeches has been more remarkable than I have ever remembered—(cheers)—and I do hope that for the future we may have the practice repeated, and an economy of time introduced into matters of pleasure. (Loud cheers.) Allow me now, in conclusion, to say, using a theatrical expression—"I thank you for your indulgence, as I am an actor who on short notice consented to read his part." (Cheers and laughter.)

The company then separated.

THIRD ANNUAL CONFERENCE.

The Third Annual Conference, between the Representatives of the Institutions in Union and the Council of the Society, was held on Wednesday the 4th inst., at the Society's House, in the Adelphi. Mr. Harry Chester, Chairman of Council, presided.

The following Members of Council were present:—Mr. C. Wentworth Dilke (V.P.), the Dean of Hereford, V.P., the Rev. Dr. Booth, F.R.S., Viscount Ebrington, Mr. Peter Graham, and Mr. J. C. MacDonald.

The following is a List of the Institutions represented at the Conference, and of the names of the respective Representatives;

Aberdeen, Mechanics' Institution	Mr. Alexander Bain.
Andover, Hants and Wilts Educational Society	The Hon. and Rev. Samuel Best.
Bakewell and High Peak, Institute	Mr. Francis Barker.
Banbury, Mechanics' Institute	Mr. R. H. Rolls.
Basingstoke, Mechanics' Institute	Mr. Wyndham S. Portal.
Bath, Commercial and Literary Institution	Mr. E. James Payne.
Battersea, Literary and Scientific Institute	Mr. J. C. Buckmaster.
Battle, Mechanic's Institution .	Rev. Edward Parry.
Bedford, Literary and Scientific Institution	Dr. T. Herbert Barker.
Bexley Heath, Society for the Promotion of Useful Knowledge	Mr. Flaxman Spurrell.
Bicester, Literary Institution and Mutual Improvement Society	Mr. W. Johnson, F.R.A.S.
Birmingham, Polytechnic Institution	Mr. G. Dawson, M.A.
Boston, Athenæum	Mr. J. W. Bontoft.
Braintree and Bocking, Literary and Mechanics' Institution	Mr. G. Courtauld.
Bramley, Mechanics' Institute	Mr. Thomas J. Pearsall.
Brighton, Athenæum and Young Men's Literary Union	Mr. W. D. Savage.
Bristol, Athenæum	Mr. Edward Halsall.
,, Early Closing Association (Education Department)	Mr. John Howells.
Bromley, Literary Institute . .	Mr. Samuel P. Acton.
Chelmsford, Literary and Scientific Institution.	Mr. W. W. Duffield.
Chester, Mechanics' Institution	Rev. A. Rigg.
Crieff, Mechanics' Institution .	Mr. James Maxtone.
Darlington, Mechanics' Institution	Mr. Hugh Dunn,
Dedham, near Colchester, Literary Institution	Rev. Gerald Lermit.
Derby, Mechanics' Institution .	Mr. Thomas Madeley (Mayor).
Devizes, Literary and Scientific Institution	Mr. R. W. Biggs, LL.D.
Devonport, Mechanics' Institute	Mr. T. Woollcombe.
Dover, Museum and Philosophical Institution	Rev. William Yate.
Epsom and Ewell, Literary and Scientific Institution	Mr. A. O'Brien Jones.
Exeter, Literary Society . . .	Mr. John Sillifant.
Falkirk, School of Arts . . .	Mr. R. W. Kennard.
Falmouth, Mechanics' Institute	Mr. W. King Norway.
Farnham, Mechanics' Institution	Mr. H. Poppleton.
Galway, Royal Institution . .	Dr. Bensbach.
Glasgow, Mechanics' Institution	Professor Laing.
Gloucester, Literary and Scientific Society.	Mr. Jelinger Symons.
Guildford, Institute	Mr. E. W. Martin.
Hampton (Middlesex), Literary Society	Rev. C. Boutell and Mr. A. S. Mansfield.
Hastings, Mechanics' Institution	Mr. John Banks.
Highgate, Literary and Scientific Institution	Mr. J. S. Godfrey.
Hitchin, Mechanics' Institution.	Mr. Joseph Pollard.
Holmfirth, Mechanics' Institution	Mr. John Hixon and Mr. J. Beardsell.

Horsham, Literary and Scientific Institution	Mr. T. Sanctuary.
Huntingdon, Literary and Scientific Institution	Mr. Michael Foster.
Hythe, Reading Society	Mr. E. Ashdown.
Ipswich, Mechanics' Institution	Mr. T. S. Gowing.
Leeds, Mechanics' Institution and Literary Society.	Mr. Thomas Wilson.
,, Yorkshire Union of Mechanics' Institutes	Mr. E. Baines, & Mr. J. Hole.
Liverpool, Mechanics' Institution	Mr. William Brown, M.P.
London, Bank of England Library and Literary Association	Mr. Matthew Marshall.
,, Clapham, Literary and Scientific Institution.	Mr. James Tell Topham.
,, Jews' and General Literary and Scientific Institution	Mr. M. S. Oppenheim.
,, London Mechanics' Institution	Mr. S. Vallentine.
,, Marylebone Literary and Scientific Institution	Mr. Jacob Bell.
,, North West London Christian Literary Institute	Mr. G. W. Tisoum.
,, Walworth Literary and Scientific Institution	Mr. J. S. Noldwritt.
Longton, Athenæum and Mechanics' Institution.	Dr. S. P. Goddard.
Lynn, Conversazione and Society of Arts.	Mr. Henry Edwards.
Maidenhead, Mechanics, Literary and Scientific Institution.	Mr. W. Stephens.
Manchester, Mechanics' Institution.	Mr. E. Hutchings, and Mr. C. Rumney.
Morpeth, Mechanical and Scientific Institution	Mr. Matthew Soulsby.
Newport (Monmouthshire), Athenæum & Mechanics' Institute	Mr. John Harrison.
Norwich, Young Men's Institute	Rev. A. Bath Power, M.A.
Nottingham, Mechanics' Institution	Rev. B. Carpenter.
Oldham, Lyceum	Mr. W. J. Fox, M.P.
Peterborough, Mechanics' Institution	Mr. John Whitwell.
Poole, Mechanics' Institute	Mr. George G. French.
,, Town and Country Library and Literary Institute.	Mr. H. W. Reveley.
Portsmouth and Portsea, Literary and Philosophical Society	Rev. H. Hawkes.
Rawtenstall, Mechanics' Institution	Mr. J. B. Whitehead.
Redruth, Institution for the Promotion of Useful Knowledge	Mr. W. M. Grylls.
Reigate, Mechanics' Institution.	Mr. T. Martin.
Repton, Institute	Mr. W. Prince.
Romford, Literary and Mechanics' Institution	Rev. W. Taylor Jones, M.A.
Royston, Mechanics' Institute	Mr. John Warren.
St. Leonard's, Mechanics' Institution	Mr. S. Putland, jun.
Sevenoaks, Literary and Scientific Institution	Mr. G. Franks.
Sheffield, People's College	Mr. T. Rowbotham.
Shelton, Potteries Mechanics' Institution	Mr. Smith Child, M.P.
Shrewsbury, Church of England Literary and Scientific Institution.	Mr. R. A. Slaney.
Slough, Mechanics' Institution.	Mr. G. Kershaw.
Staines, Literary and Scientific Institution	Mr. Riching.
Stamford, Institution	Mr. E. Cayley.
Stirling, School of Arts	Mr. James Morrison.
Stockton-on-Tees, Mechanics' Institute of Literature and Science.	Mr. T. J. Pearsall.
Stourbridge, Mechanics' Institution	Mr. J. C. Addyes Scott.
Sudbury, Literary Institution and Museum	Rev. C. Badham, M.A.
Thame, Institute	Mr. James Marsh.
Trowbridge, Mechanics' Institute	Mr. George Haden.
Tunbridge Wells, Useful Knowledge Institution	Mr. N. E. Stevens.
Uxbridge, Literary and Mutual Improvement Society	Mr. J. Hunt.
Wandsworth, Literary and Scientific Institution	Mr. Paul Blackmore.
Warrington, Mechanics' Institution	Mr. E. Brewtnall.
Warwick, Athenæum	Mr. Richard C. Heath.
Wellingborough, Mechanics' Institution	Mr. T. S. Curtis.
West Bromwich, Institution for Advancement of Knowledge	Mr. J. T. Brown, Jun.
Westerham, Literary Institute	Mr. W. Pywell.
Whitehaven, Mechanics' Institution	Mr. R. Medway Musgrave.
Windsor and Eton, Literary, Scientific and Mechanics' Institution	Mr. C. T. Phillips.
Wiveliscombe (Somerset), Mutual Improvement Society	Mr. J. Gostick.
Woburn, Literary and Scientific Institution	Mr. W. Farrow.
Wrexham, Literary Institute	Mr. T. Edgeworth and Mr. W. Raimondi.
Yarmouth & Southtown, Young Man's Institute	Mr. James Barber.
York, Institute of Popular Science and Literature	Mr. George Leeman (Lord Mayor of York.)

The Chairman said he was happy to see the gentlemen representing the Institutions in Union again at the Conference. He had been engaged for some short time in an interlocutory conversation with the Secretary as to the minutes. He found that the whole of the proceedings of the last Conference were set out at full, and were published at length in the Society's Journal. He did not know whether the meeting would wish to have them read? Perhaps, gentlemen would dispense with the usual form of preliminary proceedings. (Hear.) The business proposed to be dealt with that day, was the outline of a bill to facilitate the acquisition of sites by the Institutions, and for rendering fresh deeds of conveyance unnecessary on the appointment of new trustees;—next, the proposed system of examination of the members of classes of Institutions in Union;—next, the granting of Parliamentary Papers, and the proposal to make the Institutions of a more educational character; then, plans of farm buildings; the necessity of cheap drawing apparatus; the taxes on knowledge; the subject of a decimal coinage; the question of industrial pathology; and the general necessity for improving the amusements of the people. This ended the long list of subjects for discussion, and if they were each discussed fully they must sit a very long time, and the matters must be dealt with speedily. The first thing would be to call upon the Secretary to read a Report he had addressed to the Council as to the business of the Union for the past year. It would be

remembered that on the former occasion the Report which was then read was from a Committee who at the time conducted the business of the Institutions in Union. The Council had subsequently thought it better to take the matter into their own hands.

Mr. Foster then proceeded to read his Report

To the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce.

Gentlemen,—In compliance with your wishes, I beg to lay before you a Report of the proceedings of the past year, with reference to the business of the Union of Institutions.

In the first place, the number of Institutions now actually in union is 355; of these, 85 have joined since the last Conference. During the year three Institutions have withdrawn from the union, and three have ceased to exist. Among the Institutions which have joined the union are the Chambers of Commerce in the important mercantile towns of Liverpool and Hull.

The first proceeding of the year was the formation and issue to the Institutions of a list of lecturers, compiled from returns made by the Institutions themselves, of such persons as their experience warranted them in recommending to each other. The list thus framed has been well received by the Institutions, as the numerous communications I have received from them on the subject abundantly testify; and I am warranted in recommending to the Council that, should it meet with the approval of the Conference, steps should be immediately taken for issuing a revised edition.

The supply of books at reduced prices to the Institutions has engaged much attention. It is satisfactory to report that arrangements have been effected with a large number of the leading publishers, under which the Institutions in Union can obtain books and maps at a considerable reduction on the published prices. It is unnecessary for me to enter at length into the details of these arrangements, as they will be familiar to the Institutions. The amount of the book orders during the eight months the arrangement has been in operation is upwards of £900, reduced prices. The discount has averaged more than 25 per cent.

The impulse which the Society's Photographic Exhibition, held in the winter of 1852-3, gave to that art, and the interest which it excited in the minds of the public generally, induced the Council to believe that if a collection of such works could be made and sent to the Institutions, they would not only be valued by the members, but might also become the basis of local exhibitions. A single collection was therefore made, and a route drawn out for its passing from one Institution to another in the order of application, so far, at least, as the different localities would admit. The success of this first collection was so great, and the applications for it were so numerous, that a second collection was formed. These two collections are now in course of circulation, one in the Midland and Northern Counties, the other in the Western and Southern Districts; and, in order to meet the many subsequent applications, a third set has also been got together, and has been sent to various institutions not included in the two previous routes. The Society has also been able to lend its assistance in furnishing objects of interest to be placed in local exhibitions. Amongst them I may particularise the Collection of Samples of raw and partly-manufactured produce, presented to the Society by Her Majesty's Commissioners for the Great Exhibition of 1851; Examples and Materials for Schools of Design, recommended by the Department of Science and Art; a small cabinet of Educational Apparatus from the National Society, and Specimens of Nature-Printing from Dr. Branson, the Imperial Printing Press at Vienna, and Messrs. Bradbury and Evans. I may add, that from letters received, it appears that in many instances very successful exhibitions have been held, and that the funds of the Institutions by which they have been established, have been benefitted, whilst at the same time there has been an accession in members.

With respect to the Legal Position of Institutes, which was discussed at the last Conference, a Bill has been prepared, which Mr. Hutt, a Vice-President of the Society has brought into, and taken charge of, in the House of Commons, where it stands for Committee on Wednesday, the 5th of July. The object of the Bill is to facilitate the acquisition of sites by the Institutions, and for rendering fresh deeds of conveyance unnecessary on the appointment of new trustees. The Bill also places the personal property of Institutions upon a more satisfactory footing as regards their legal rights, both in a civil and in a criminal point of view.

During the present year the works named in the following list have been presented to the Society for distribution among the Institutions in Union:—

Her Majesty's Treasury.—Report on the Organisation of the Permanent Civil Service.

The late Right Hon. H. Tufnell, M.P.—Report of Committee on Distribution of Parliamentary Papers.

Dr. Herbert Barker.—On Medical Meteorology.

John Bright, M.P.—Welford on the Game Laws.

Messrs. Gibbs, Bright, and Co.—The Eagle Herald.

George Griffith.—Life of George Wilson.

The Dean of Hereford.—Suggestive Hints towards Improved Secular Education.

Mr. Leone Levi.—Report of Meeting for the Formation of a Mercantile College in the City of London.

Lieut.-General Sir C. Pasley, K.C.B.—Complete Course of Practical Geometry.

Proprietors of Journal of Industrial Progress.—Specimen Copy.

Proprietor of Irish Quarterly Review.—Specimen Copy.

W. A. Provis.—An account of the Suspension Bridges over the Menai Straits.

Rev. C. Richson, M.A.—Lecture on Mechanics' Institutes.

Dr. Southwood Smith.—On Sanitary Improvement.

Thomas Sopwith, F.R.S.—Lecture on Education—On Benefit Societies—Tract on Friendly Societies—On Mining Records—On Surveying and Levelling.

Professor Sullivan.—Facts and Theories concerning the Beet Root Sugar Manufacture in Ireland.

Thomas Twining, Jun.—On the Condition of the Working Classes of Nassau.

With reference to the question of the Paper Duty I would refer to the following extract from the annual report of the Council, made to the members of the Society on the 14th of last month: "The Council, during this Session, collected and embodied, in the form of a report, which was published in the Society's Journal, all the information which they could obtain on the operation of the Paper Duty. A memorial founded thereon was prepared, and a deputation to the Chancellor of the Exchequer, for the purpose of presenting it, contemplated, but the disturbed state of Europe led the Council to think that a less formal mode of procedure was preferable, and accordingly the memorial was transmitted to Mr. Gladstone privately by the Chairman."

With respect to the resolution passed at the last Conference of Representatives relative to the desirability of a more systematic Class instruction in Institutions, I would refer again to the Council's last report to the members, in which they say: "In order to stimulate the formation of Classes in Institutions, and thus render them more effective as educational establishments, the Council has been occupied in devising a scheme for the examination of members of such classes, and for granting to them certificates of attainment."

The outline of this scheme has already appeared in the Society's Journal.

The Committee "On Education as connected with Arts, Manufactures, and Commerce," consisting of Lord Ashburton, the Dean of Hereford, and the Rev. Canon Moseley, have drawn up the following list of subjects for examination:

1. Mathematical Sciences.
2. Experimental Sciences.
3. Sciences of Observation.
4. Mechanical Sciences.
5. Social Sciences.
6. Fine Arts.
7. Moral and Metaphysical Sciences.
8. Literature.

Under the first head are included Geometry and Algebra, with their applications to Geodesy, Navigation, and Nautical Astronomy.

Under the second, Chemistry, Electricity, Magnetism, Physical Optics, Photography, &c., and Manufacturing Processes dependent on the above.

Under the third, Practical Astronomy, Geography, Geology, Mineralogy, Chrystallography, Zoology, Comparative Anatomy, Physiology, Botany, Meteorology, and Microscopical Observation.

Under the fourth, Mechanism, Machinery, Engineering Constructions, Economy of Materials and Labour in Construction, Architectural Construction and Naval Architecture.

Under the fifth, Economy of Trades, Manufactures, and Commerce, Political Economy, Domestic Economy, and Social Science.

The following gentlemen have already consented to act as examiners:—Professor G. B. Airy, F.R.S.; Mr. W. Sterndale Bennett; Rev. Dr. Booth, F.R.S.; Mr. C. Brooke, F.R.S.; Rev. R. W. Browne, M.A.; Dr. W. B. Carpenter, F.R.S.; Rev. S. Clarke, M.A.; Professor C. K. Cockerell, R.A.; Rev. Dr. Elder; Mr. J. Glaisher, F.R.S.; The Dean of Hereford; Mr. J. Hullah; Mr. Robert Hunt, F.R.S.; Dr. H. Bence Jones, F.R.S.; Rev. H. G. Liddell, M.A.; Rev. Canon Moseley, F.R.S.; Rev. J. P. Norris; Dr. Lyon Playfair, C.B.; Rev. A. Bath Power, M.A.; Mr. F. R. Sandford; Mr. J. Simon, F.R.S.; Rev. F. C. Temple; Rev. Dr. C. J. Vaughan; Dr. T. Watson.

As respects the Society's Journal I would refer to the recent Report of the Council to the Members, which on this head is as follows:—

"The Council regards with great satisfaction the improved character of the Journal. During the Session it has been found necessary to give an increased number of pages, so that the Papers read at the evening meetings, and the Discussions upon them, might be printed at length instead of in abstract only, as was previously the case. It is believed that this alteration adds considerably to the value and interest of the Journal. The change from the former weekly proceedings of the Society to the present Journal, though undertaken with due consideration, could, in the first instance, only be considered in the light of an experiment. Experience, however, has fully justified the change, and though the Council hopes to see still further improvement in the Journal, it is obvious that it has already become an important element in the Society's action, and cannot fail to exercise a considerable influence in promoting its objects."

On the subject of the Statistics of Institutions, I regret that I cannot report any satisfactory result. Though forms have been issued to every Institution in the country, with a request for information on various heads, and though the Institutions were frequently reminded of the importance of the subject, yet less than two-thirds made any return whatever. This being so small a proportion of the whole number, did not warrant their being published. It is not perhaps surprising that such should have been the result, looking at the time and trouble necessary for filling in the returns, and that such work would have to be done in most instances, not by paid officers whose time was at the disposal of the Institution, but by individuals whose services are generously and gratuitously given, and whose only available time for the purpose is snatched at intervals from their own private business.

It may not be out of place if I refer here to the Resolution lately passed by the Council, with reference to the visits of artizans to the Paris

Exhibition of 1855. The minute of Council is as follows:—

"Took into consideration the advantages which would be likely to accrue to Arts and Manufactures from visits made by the artizans of this country to the Paris Exhibition of 1855, and to the numerous Artistic and Scientific Institutions in that capital, and Resolved—That the Council is of opinion that timely and well organised arrangements might be made to conduce greatly to the economy, comfort, and usefulness of such visits; and that it would be desirable that measures should be immediately taken to induce the artizans of the United Kingdom to give attention to the subject, and make preparations for visiting Paris next year.

"That it appears to the Council, that the Institutions in Union with the Society offer excellent means for inviting the attention of the artizans to the advantages to be derived from a visit to Paris, as well as for organizing measures by which artizans may at once begin to make weekly deposits to provide for the necessary expenditure. The Council would therefore suggest, that a small special committee be formed in each Institution, and that a responsible treasurer be appointed to receive weekly deposits; but upon this subject the Council would be glad to have the opinion of the Conference to be held on the 4th of July.

"That as soon as the Council is sufficiently informed by the Institutions of the progress made, they will enter into negociations with railway and steam-boat companies, and collect and publish information upon lodgings, &c., in Paris.

"Resolved that as a Committee of correspondence for this object, Viscount Ebrington, Messrs. C. Wentworth Dilke, T. De la Rue, Winkworth, Wilson, Saunders, Bird, and Lieut.-Colonel Eardley-Wilmot, R.A., be requested to act and receive communications."

On the subject of the distribution of Parliamentary Papers to Institutions, I may remind the Council that a Committee of the House of Commons, of which the late Right Hon. Henry Tufnell was Chairman, sat during the last Session of Parliament, and made a report in favour of a gratuitous distribution, under certain conditions; but being made at the close of the Session it was too late for the House of Commons then to take any action upon it. Mr. Tufnell, at the commencement of the present Session, gave notice of his intention of bringing the matter before the House, with the view of having the recommendations of the Committee carried into effect. The state of Mr. Tufnell's health from time to time rendered it necessary to postpone the subject, and ultimately that lamented gentleman's death has put a stop to all further progress in the matter for the present Session. Whilst on this subject I may remind the Council that it has been suggested as very important, that the Indexes and Specifications of Patents, printed by the Commissioners of Patents, should be widely circulated, and that the Institutions in Union present a very favourable medium for this purpose. I will take the liberty of suggesting to the Council whether the question of the distribution of these valuable and interesting documents should not be brought before the Conference of Representatives, with a view to some steps being taken to petition the proper authorities on the subject.

A Committee, consisting of the Marquis of Blandford, Dr. T. K. Chambers, Mr. J. Smith, and Mr. T. Twining, Jun., has recently been appointed by the Council to investigate and report on "Industrial Pathology, or the accidents and diseases incident to various industrial occupations." This appears to be a subject in which the members of Institutions in Union are greatly interested, and on which they could render very valuable assistance. I would therefore suggest to the Council whether this subject also should not be brought to the notice of the Conference.

At the Conference of last year it was stated that the Council had it in contemplation to hold an Educational Exhibition. The following extract from the Council's report shews how this pledge has been redeemed:—

"The Council desires now to bring before the attention of the members the great work which it has undertaken —and which it believes to be worthy the Centenary of the Society—the organization of an Educational Exhibition, in which will be collected the various educational appliances in use, not only in the different establishments in this country, but in many of the Continental states, and in the United States of America. The Society's premises not being sufficiently large for this purpose, the Council has thought it right to hire St. Martin's Hall; and it has every reason to expect that the Exhibition will be most successful, a very large number of applications for space to exhibit having been returned by intending exhibitors in this country, whilst many foreign countries have already announced their intention of sending contributions.

The Council seeing that the establishment of this Exhibition would involve a very large expenditure of money beyond what it was prudent or right to charge upon the Society's funds, appealed to its members for subscriptions in aid of the undertaking, His Royal Highness the President having expressed his intention to subscribe 100*l.* towards it. The subscriptions, including that of His Royal Highness, now amount to 696*l.* The Exhibition will be opened in St. Martin's Hall, on Tuesday, the 4th of July, with a *Conversazione*, at which His Royal Highness the President has intimated his intention to be present. The Council feels confident that such an Exhibition will not only afford means of comparison, which cannot fail to be of considerable value, to all engaged or interested in education, whilst at the same time, by calling the attention of the public generally to the subject, a stimulus may be given to the cause of education. It is intended to have lectures and practical discussions on educational subjects during the period of the Exhibition. Several Commissioners have already been appointed by foreign Governments to visit the Exhibition, and report on its results, and there is reason to believe that a considerable number of foreigners interested in the subject will avail themselves of the same opportunity. The Council feels assured that it is to an improved education of the people we must look, if the Arts, Manufactures, and Commerce of this country are to maintain the position they have hitherto held."

In conclusion, I must add that the prospects of the Union are most cheering. The cause of popular and improved education has much advanced; the public are becoming every day more and more convinced of its importance, and the Literary and Scientific Societies and Mechanics' Institutes of the United Kingdom have had, and I doubt

not will continue to maintain, an important influence in this movement.

I have the honour to be, Gentlemen,
Your most obedient humble servant,
P. LE NEVE FOSTER,
Secretary.

The CHAIRMAN said, that as nearly all the more important topics touched on in this report would come under consideration, it would perhaps be better, as their time was short, and they had so much business before them, that they should first enter upon the subject of the bill now before Parliament. He begged to state, that before any gentleman made any observation, the custom was that each speaker should be limited to five minutes, and he hoped he should not have to hold up the "five-minute glass" in a hostile manner. He trusted that each gentleman would confine himself to the pith of the question under discussion. With regard to the bill before Parliament, the Council had had it reprinted, and he hoped each gentleman had a copy before him. That bill was to pass through Committee on Wednesday next. If, therefore, the Conference had any communication to make to Parliament on the subject of the bill, there was no time to be lost. It would probably strike many gentlemen present as somewhat remarkable, that there was no mention in the bill of a subject which excited so much interest last year, and which they must always bear in view, namely, the question of rating these Institutions. There existed a great deal of difference of opinion out of doors on this matter. It was improbable that any measure having for its object to provide for extending the exemption of Institutions from local rates, would pass, and it was thought by the promoters of the bill that it would be better, for this Session, to forego all attempts to deal with this subject, and to confine the bill to those matters which were likely to pass through Committee. Hitherto the bill had not met with any opposition. It would not be necessary to read the whole of the bill, as most of the Representatives were, no doubt, acquainted with its provisions. Every gentleman who rose to speak would please to give his own name, and that of the Institution which he represented.

LITERARY AND SCIENTIFIC INSTITUTIONS BILL.

Mr. EDWARD HALSALL (Bristol Athenæum) felt some hesitation in "breaking ground," but the subject of rating was one of considerable importance to large institutions such as he represented—the amount of rating in his neighbourhood being very heavy, as he had observed on the last occasion, and consequently a large sum being withdrawn from the uses of these institutions. He thought the question of defining the exemption from rating would be a very desirable one to introduce in the bill before Parliament. There had been a great contrariety of decisions on the question of exemptions in different parts of the kingdom, and it would be satisfactory that such exemptions were defined; he thought there should be no difficulty in doing this. He would suggest something to this effect, that institutions *bona fide* for the purposes of instruction, where the parties did not divide profits, should be exempt.

The CHAIRMAN believed that if they attempted to introduce such a clause the result would be that the subject would be referred to a Committee, and the question would thus be shelved for the Session. The question was whether it would not be better to take the bill as it stood.

Mr. HALSALL said he should be sorry to hazard the success of the bill.

Mr. RAIMONDI (Wrexham) said he had the honour to represent an Institution which had a great desire to obtain a site near the town, but much difficulty had arisen from the inability of the parties to get a proper conveyance; and as this was a matter more for the consideration of the Legislature than a discussion here, he hoped that gentlemen would not offer many observations on the bill, but allow the Conference to proceed to other business, leaving the bill in the hands of the members who had charge of it. It would be a great boon to institutions generally, and would afford an opportunity hereafter to obtain the object they desired.

The CHAIRMAN said that if that was the view of the Conference, they might pass a resolution in favour of the bill.

Mr. S. VALLENTINE (London Mechanics' Institution) said he had one objection to urge to the bill, namely, that it allowed the interference of the Charity Commissioners in the affairs of Institutions. He alluded to clauses 26, 27, and 32. Clause 26 allowed the Institutions to make bye-laws; by clause 27, if any member objected to any bye-law, he had nothing more to do than apply to the Charity Commissioners. They might make inquiries and abrogate that law. Such interference, he considered, was uncalled-for and mischievous. He thought the proper persons to deal with these matters were the governing bodies, or the members themselves; but, instead of that, the objector, through the Charity Commissioners, might abrogate a law which was in the highest degree useful. The Charity Commissioners might abrogate a law carried by the assent of three-fourths of the members.

The CHAIRMAN said—It should be explained that the object of the clause was to afford facilities and a cheap process of doing that which might be done at the present time by an expensive process. At present it was not competent for these societies to extend the objects for which they were originally instituted. If the whole body agreed to extend the objects of the society, any one member who took an exception to that might involve the society in a Chancery suit, the result of which he would leave them to judge. The object was to provide a cheap remedy in place of an expensive and almost intolerable one; and it was not proposed to give to a new body a power which did not at present exist, but to prevent an institution being drawn into the Court of Chancery—the appeal being to the Charity Commissioners instead, and that appeal must be by one-fourth of the members instead of one individual.

Mr. VALLENTINE wished to put a question to the Chairman. Supposing an institute had been in the habit of giving two lectures per week, and they should think fit to abridge their operations by giving only one lecture per week?

The CHAIRMAN.—Oh, no!

Mr. EDWARD BAINES (Yorkshire Union of Mechanics' Institutes) would beg to put another question. He confessed he shared, to a certain extent, in the apprehensions of the last speaker; and with regard to the Chairman's explanation, as to the facilities for appeal, that might tend to make it more injurious, because a power which was expensive and unwieldy could not be so readily resorted to as an appeal of a simple and easy kind. Very few individuals would think of taking an institution

into Chancery, but it was quite possible that a minority would not hesitate to appeal to the Charity Commissioners, when they could do so cheaply, in order to avert an alteration to which they were opposed. In his opinion, nothing was so important in Mechanics' Institutes as to hold out the prospect of continual progress and improvement. In the institution which he represented, a gentleman who sat near him (Mr. Wilson) had taken an active part in establishing day schools in connection with the institute. They began with evening schools; they had now 200 boys under instruction, and they were about to introduce a girls' school. In order to do this the institute had to take fresh powers, and to make new rules from time to time; it was in fact an extension of its objects and operations. The question he would ask of the chairman was, whether such fresh objects might be adopted by the members themselves, or whether, in consequence of such extension of objects, it would be in the power of any small section of the members to take the matter before the Charity Commissioners?

The Chairman said—Not being a lawyer, he could not give an opinion upon a legal question to which he would wish the Conference to attach any notice or importance; but he took it that such an extension of objects would not, as matters stood at present, be legal. The effect of the first of the two clauses was to give power to extend the objects. It was for the Conference to consider whether that was a desirable power. If it was desirable, Parliament would not accord that power without certain safeguards; but whether or not those proposed were the best that could be adopted, it was not for him to say.

Mr. T. Woollcombe (Devonport Mechanics' Institute) said that, agreeing to a great extent with the sentiments expressed by the two last speakers, as to the extreme jealousy with which the institutions ought to regard an attempt at interference from any central authority, he thought the object sought to be attained by this bill might be accomplished in a more safe and certain manner. As a lawyer, he knew the extreme difficulty there was of extending the objects of an institution without the assent of every individual member; and he felt it was very important for the interests of these institutions, that there should be some ready means for getting assent to such extension. The 26th clause stated that every institute might make bye-laws for its better government; then it went on to give the power to one-fourth of the members to contest any bye-law. Now, he thought it would be obvious to all present that that would be giving to the Charity Commissioners power to interfere with the absolute regulations of the institutions, which kept the power to make bye-laws within their own province. Any bye-law for the better government of a society ought certainly to be strictly within the control of the members. With the view of giving members of institutes an opportunity of extending these objects, he thought if the construction of the clauses was to a certain extent inverted, giving to three-fourths or four-fifths of the members an opportunity of submitting an appeal to the Charity Commissioners, everything would be obtained which the framers of the bill appeared to think desirable; and, at the same time, it would protect these societies from the danger of interference, which he confessed he looked upon with apprehension. He would say, let them not give the minority such a power, because he feared the effect would be to introduce dissension in institutions.

Mr. Jelinger Symons (Gloucester Literary Society) said, the 27th clause empowered the Charity Commissioners to inquire into the same (*i. e.* the complaint), whereas the gentleman who first mooted this question implied that the Commissioners were to decide upon the same (the complaint) with or without inquiry. In the first instance, they were to inquire into the same, and the inquiry was limited by these words, "and if they shall determine that such bye-law is improper, *regard being had to the purpose of such Institution*, they shall annul the same." Those objects, he apprehended, were clearly stated in the 38th section of the bill. At the same time he thought there was a great deal of justice in the view taken by Mr. Woollcombe, and it seemed to him to give too much individual power that one member should have the opportunity of setting an inquiry on foot. They all knew that in every society there were officious gentlemen who would give trouble which perhaps might be spared to the Charity Commissioners; and he thought that, as that body was likely to be overwhelmed with work, they ought to be protected from the vexatious proceedings which a few captious individuals might be inclined to embark in. He would suggest that the power of appeal should be vested in not less than 10 or 12 of the members. He thought, in the objects of these Institutions, that of "The Diffusion of Useful Knowledge" ought to be defined. In order to be useful, knowledge must be practical, and then they would have the masses of the people sympathising with their objects, and giving their support to these institutions.

The Chairman remarked that the object "Diffusion of Useful Knowledge" was defined in the preamble of the bill, although those words did not appear in the title. With regard to the general question whether they ought to vest undue power in a central authority, he thought there was some weight in the observation of Mr. E. Baines. Perhaps the best mode of meeting the question would be to appoint a deputation, consisting of the four gentlemen who had taken part in this discussion, who were either lawyers or who had a clear knowledge of the subject, to wait upon Mr. Hutt, the promoter of the bill, and point out the matters which appeared to require some alteration. (Hear hear.)

Mr. Jacob Bell (Marylebone Literary and Scientific Institution) concurred in the objections made to the clause under discussion, inasmuch as it gave a power of appeal on the part of the minority against bye-laws which were made by the institutions themselves. The 27th clause stated that, "if any member of an institution shall deem any bye-law to be contrary to the purpose, or detrimental to the welfare of the institution, he may make application to the Charity Commissioners to inquire into the same," &c. That comprised every bye-law that was introduced, because any one individual might stand up and say, "I think such and such a bye-law detrimental." It might be a question of fact whether it was contrary to the charter, but it was only a matter of individual opinion, whether it was or was not detrimental to the welfare of the institution. There was nothing more injurious to institutions like these than disagreements amongst the members—(hear, hear)—and when such took place, there was only one way of settling them—that was, putting the thing to a vote. But if three-fourths should be of one way of thinking, and only an insignificant minority thought the other way, the minority might involve the society in a dispute which might last for years, to the great detriment of the institution itself. (Hear, hear.) In fact, under such a system no institution was safe from being broken up. He spoke from experience on this subject, as he knew an instance in which an institution had been embroiled in a dispute for years through one member; and if these proceedings were made so easy as they would be by the provisions of this bill, there were not wanting in almost any institution factious individuals, who would not hesitate to break it up. He disapproved of that clause entirely, and he would rather it should be expunged than run the risk of throwing the institutions into the discord which would be sure to follow upon such a clause, or that they should place themselves under a central authority who could know nothing of the local circumstances which had led to the introduction of the bye-laws, to which objections might be raised by a small section of members, or by one individual alone. (Hear, hear.)

Viscount Ebrington thought there was a great deal of reason in the objections that had been stated; but,

at the same time, when they looked at the constitution of these institutions, in being able to hold property confided to them for the purpose of carrying out certain objects, they must look jealously at the rights of the minority, because it might answer the purpose of the majority to vote acts which would be equivalent to confiscating the property and rights of the minority, and on the strength of the reverse of which contributions to the institutions might have been originally given. Therefore, it appeared to him that, whilst they sought, as it were, a protection against peccant members, and to establish a more corporate existence, they ought to have some disinterested tribunal to which appeal could be made, in order to prevent *might* being turned into *right*, by the sudden introduction of a number of members, for the purpose of carrying some proposition which was not consistent with the original purposes of the institution, or which might be repugnant to the feelings of the minority, who, it might be, had been the founders of the institution, and who might represent the feelings of those who had most largely contributed towards its support, and who really represented the objects and purposes for which the institution had been established. Without saying this was the best way of providing against the difficulty, they must recollect that almost every good cause had, at some time or other, been in the minority; and they must, therefore, look to the protection of the minority where the purposes of an institution might be changed by the vote of the majority.

The CHAIRMAN believed the Conference had come to this—that all points coming fairly within the scope of ordinary bye-laws, should be governed absolutely by the majority. That was strongly his own opinion. In points where it was wanted to go beyond the ordinary line, the Conference seemed to think that there should be some appellant authority; but it felt jealous of that authority, fearing that it might be used factiously by one individual, or by two or three individuals. (Hear, hear.) If that was the sense of the Conference, and if the four gentlemen he had named would form a deputation to wait upon Mr. Hutt, not later than the next day, he had no doubt any necessary alterations would meet with a favourable consideration, and might be ultimately carried out.

The Rev. WILLIAM TAYLOR JONES, M.A. (Romford Literary and Mechanics' Institute), thought it necessary that they should understand the definition of "bye-law." Some institutions adopted a certain number of rules, and the laws that were applied to the different departments were all regarded as bye-laws. He thought no law altering the constitution of the society ought to be passed without a power of appeal.

Mr. T. S. GOWING (Ipswich Mechanics' Institute), said a declaratory clause might meet the case—that no law altering the objects for which the institution was established should be passed without the power of appeal to a separate body.

Mr. HENRY EDWARDS (Kings Lynn Conversazione and Society of Arts), thought that might be obviated by having properly drawn rules in the first instance. It was not proposed by this bill to alter the objects, but to introduce a new mode of carrying them out. Having been, beforehand, favoured with a copy of the bill, and having looked at it with the eye of a lawyer, he had particularly noticed the clause relating to the appeal, and it occurred to him that they need look no further than to the Council of the Society of Arts for an appellant body, in whom the utmost confidence would be reposed—(hear, hear)—and a clause constituting them the Court of Appeal could be introduced without difficulty, and he believed would give satisfaction to all parties (Hear, hear.) Generally speaking, he believed this bill would confer great benefits upon the institutions at large—especially as to deeds, to prove which he could not have done better than to have brought the large bundle of deeds that related to a case in which he was concerned. It also appeared to him that some greater facilities were required for powers to borrow money, inasmuch as to convert rent into capital, was a problem which had yet to be solved. What they wanted, was the power to raise money upon short transferable securities, something like the debentures of the Westminster Improvement Commissioners, at a moderate rate of interest.

Mr. THOMAS J. PEARSALL (Bramley and Stockton-on-Tees) considered that the power of appeal vested in one individual would operate injuriously. Mention had been made that one of the objects of these institutions should be the diffusion of useful knowledge. The question was, to define what useful knowledge was. He had known great disunion in an institution upon the proposition for the introduction of music and chess, and he had no hesitation in saying that where music did not form one of the original objects, the attempt to introduce that science would create an element of discord. (Laughter.) He could give an instance in which an announcement was made of a performance of music of a solemn character—not oratorios—but styled "sacred songs," which led to the dismissal of the musical performers from the chapel where they had previously officiated. Then there was the disputed question, as to the introduction of works of fiction into the libraries. Upon that great diversity of opinion existed, and he could mention an instance in which, owing to one member of an institute presenting to the library a copy of the Waverley novels, another member took himself out of the institution; and yet the man who had conscientious scruples against the introduction of works of fiction, had no qualms of conscience on account of selling adulterated articles of food. (Laughter.) Amidst such conflicting elements, therefore, it was desirable that some definition of useful knowledge should be given.

Mr. MATTHEW MARSHALL (Bank of England Library and and Literary Association) thought the clauses under discussion were entitled to the gravest consideration, because their operation was not to be confined to the institutions about to be formed under the auspices of the Society of Arts, but would affect every existing institution—including those under Royal Charter.

The CHAIRMAN said—the chartered institutions were expressly excluded by clause 22.

Mr. MARSHALL had stated that because the legal adviser of an institution to which he had the honour to belong—one of the noblest in London—had advised them that they would be subject to the provisions of this act; and with respect to the power of appeal, he could mention that through the vexatious proceedings of one individual, one of the first institutions of the kind in London, had been threatened with dissolution. Therefore he thought the consideration of that clause was a grave matter, and he hoped the sentiments which had been expressed upon it would be conveyed to Mr. Hutt, in order that some modification might be made in it.

Rev. HENRY HAWKES (Portsmouth) said he considered that the Conference was agreed on this subject, and he rose with a view of disposing of it by a motion in substance the same as the chairman had suggested, but with a slight alteration. He would move that the gentlemen whom the chairman had named, with the addition of the Chairman himself and the Secretary of the Society, should be requested to wait as a deputation from the Conference, at their earliest convenience, on Mr. Hutt, in order to communicate to him the leading differences of opinion which had now been expressed on the bill in question. He begged leave to make that motion.

The CHAIRMAN thought that the question would be met by a motion to the effect that the Conference was apprehensive that some prejudicial consequences might result from the power given to minorities in the bill, and that Mr. Vallentine, Mr. Baines, Mr. Woollcombe, and Mr. Symons should be requested to wait on Mr. Hutt, and represent to him the views of the Conference.

Rev. HENRY HAWKES was willing to move that resolution, instead of the one he had before proposed, adding to

it the names of the Chairman and of the Secretary of the Society.

Mr. George Dawson (Birmingham) seconded the motion, and said he agreed with all that had been said against retaining the clauses in question, but he thought that the objections had not been put sufficiently strongly. The fact was, that they would much rather have no bill at all than the present bill with the clauses retained. They were not yet converted to the new-fangled doctrine of the power of minorities. The effect of such a power would be that every crotchetty fellow who might feel disappointed at the rejection of his crotchet would have an appeal to the Charity Commissioners. Now, they had in England a great jealousy of Commissioners. There were too many of them, and they had already too much to do. Why, if they were to refer to the Charity Commissioners every little subject of dispute, whether such and such a book was to be admitted, or whether a ball would be a means of diffusing useful knowledge, he certainly should not envy them their posts. Then they had also every kind of pious people, who would so plague these poor Charity Commissioners with every petty squabble that they would drive them to commit suicide, or give up their situations. That was the real way of putting the question. They put it too mildly. They must state that they would rather have no bill at all than the present, and the deputation must not allow Mr. Hutt to think that the Conference in any way entertained a mild opinion with respect to the bill, but that they were prepared rather to oppose than support it. That was what they all thought, and their opinion should be strongly represented.

Mr. Duffield (Chelmsford), confessed that he had a great respect for the good old principle of following the opinions of the majority. He never yet knew of any set of right-minded men differing from the determination of the majority, and he considered that it would be detrimental to their interests for an individual or for a minority to have an appeal to the Charity Commissioners on matters of internal management. They knew well that there were in connexion with all literary institutions certain persons who had crochets which were continually involving expense and trouble to those who took an interest in their success, and whose interest was thereby in a great measure damped. It appeared to him that the best plan would be to strike out the clauses altogether. He believed that the power which the Commissioners already possessed would enable them to inquire into all kinds of abuses; for instance, whether the grants made to the institutions were devoted to the purposes originally intended by the donors or not. That power was very different to the right to interfere in the internal management of the institutions which the present bill would give them. They were, in fact, perfectly distinct—there was no connexion between them. With these few observations he begged leave to support the proposition, and to state that he agreed with Mr. Dawson, that they should use the strongest language with reference to those clauses, and he wished that some gentleman of the deputation would give him the assurance that they would so place the matter before Mr. Hutt.

Mr. Vallentine intimated that he would take care to act on the suggestion of the last speaker.

Mr. Smith Child, M.P. (Shelton), wished to call the attention of the Conference to the 24th clause of the proposed bill, which was as follows:—"Any Institution, not otherwise legally empowered to do so, may, at any meeting of its members specially convened according to its regulations, make any bye-law for the better governance of itself, and for the furtherance of its purpose and object, and may impose reasonable pecuniary penalty for the breach thereof, which penalty, when accrued, may be sued for in any local court of the district wherein the defendant shall inhabit, or the Institution shall be situated, as the governing body thereof shall deem expedient." He had no observations to offer on the question, but he thought that as the other clauses were to be expunged, it would not be right to leave the power of making bye-laws inflicting pecuniary fines that might be sued for.

The Chairman said, that he hoped there was no misunderstanding in the Conference so far as regarded the internal management of the Institutions. He understood that on that point they were unanimous to give no extraneous power to interfere with their own proceedings; but there was another point where they had to go beyond that. It was in reference to their power of recovering bequests. He would illustrate his meaning by a circumstance which had come under his own notice. Two Institutions, whose objects were considered to be similar, wished to unite, but the lawyers found that in their original constitutions there existed a slight variation in the statement of their objects, the consequence of which had been that they were unable to unite, and a sum of money left by will to them contingent on their union reverted. Now, Parliament would not give them power to inherit without a safeguard for the due administration of the funds, and therefore it was that, so far as that point was concerned, they required an appeal to some body, and it appeared to him that the 33rd clause sufficiently met that question.

Mr. Farrow (of Woburn) said that it appeared to him that the Conference was unanimous in reprobating the doctrine of the power of minorities, yet there was a large number of institutions governed by them; and for that reason he thought that there should be some appellant jurisdiction. They were all aware how difficult it was to get a sufficient number of members present, and from that circumstance arose the influence of minorities. The Institution to which he belonged was governed by a minority; and from experience he could say that the power of appeal was necessary. He had, however, his doubts as to the Charity Commissioners being the proper body to which to appeal, and would prefer the Council of the Society of Arts, a set of gentlemen of common sense, and experienced in the working of Mechanics' Institutions.

Mr. Jacob Bell (Marylebone) said, that the 55th clause stated how the surplus, if any, was to be appropriated, but it did not state what was to be done in case of a deficiency.

The Chairman thought that that was obvious.

Mr. Bell said he thought that the bill should be explicit as to who the parties were that were liable for the debts of an institution; whether the Committee, an individual Member, or the Members collectively were to be called upon to pay them.

Mr. Noldwritt (Walworth) thought it better to leave the decision of the question to the time when it might arise. He agreed with Mr. Dawson that two-thirds of the Conference were opposed to giving the minority a right of appeal. He, however, wished to ask the meaning of the 28th clause.

The Chairman replied—that as he was no lawyer, he must again caution the Conference against relying on his interpretation of the clause; but to him it appeared that the clause had reference to the 26th clause, which empowered the governing body to inflict pecuniary fines, and that it enacted that that clause should not come into operation against any individual who should have subscribed prior to the rule of the institution creating the offence.

Mr. Noldwritt inquired if that meant that some members were to be liable to be fined while others were not liable?

Mr. Gowing explained that the meaning of the clause was, that the rule of the governing body should not be *ex post facto*; and that if a person became a quarterly member before the making of the rule, and that it was made while his quarter was current, it could not be made to effect him, but that, when he renewed his subscription, he thereby signified his assent to the rule, which would thenceforth be active in his case, in the same way as any

yearly or half-yearly subscriber, during the term of whose membership any new rule might be introduced, would not be affected by that rule until after the expiration of his membership when he renewed his subscription.

Mr. WOOLLCOMBE said—that the clause was based on the principle that it was unfair, after taking a person into partnership on certain conditions, to make him amenable to whatever new terms it might afterwards be thought well to impose.

The Rev. Mr. JONES explained that he considered that the clause enabled any member to withdraw from the institution after the expiration of his term of membership, if, while he was a member, any rule had been adopted to which he could not subscribe.

Mr. SMITH CHILD, M.P., inquired if life members were to be exempt altogether.

Mr. E. W. MARTIN (Guildford) stated, that in his Institution they had a rule which fined members for a too long detention of a book from the library, and he wished to know if the clause would exempt the members from the payment of that fine.

Mr. GOWING explained that it would not, as each member who joined the institution accepted the rules of the institution in force before his admission.

Mr. FRENCH (Poole) asked for a definition of the word minority, and wished to know how its signification was modified when the majority did not attend.

The CHAIRMAN thought he had now better put the resolution which had been proposed by the Rev. Mr. Hawkes and seconded by Mr. Dawson, and then pass on to the next subject on the paper, namely, the Examination of the Pupils in the Classes of the Institutions. He should, therefore take the opinion of the meeting on the first resolution, which was to the effect—"That this Conference is apprehensive of the effects which may result from the powers of appeal given to minorities, and even to an individual, under the bill now before Parliament, entitled, 'A bill to afford greater facilities for the establishment of institutions for the promotion of literature, science, and the fine arts, and to provide for their better regulation,' and that Mr. S. Vallentine (London Mechanics' Institution), Mr. E. Baines (Yorkshire Union of Mechanics' Institutes), Mr. Woollcombe (Devonport Mechanics' Institute), Mr. Jelinger Symons (Gloucester Literary Society), and the Chairman of the Conference, be a deputation to see Mr. W. Hutt, M.P., as soon as possible, and to confer with him on the subject."—This resolution was unanimously agreed to.

POWER OF BORROWING.

Mr. H. EDWARDS said, that before the Conference proceeded to the consideration of the next subject on the paper, he wished to recall their attention to what he had already mooted in reference to a power of borrowing; and he thought that the deputation should be intrusted to represent to Mr. Hutt the propriety of introducing clauses giving them that power on the issue of debentures. He would be glad to move a resolution to that effect.

Viscount EBRINGTON said, it was not probable that Parliament would grant them that power without a guarantee. As regarded railway companies, in things of that kind they had first to apply to government for its approval. They could hardly expect to get great powers, unless they gave good security in the shape of a court of appeal approved of by the legislature.

Mr. WOOLLCOMBE, in seconding the proposition of Mr. Edwards, said, that it was very material that the Conference should advise the deputation carefully to consider this question. It was true that there were already many means in existence by which Mechanics' Institutions could borrow money, and it would be a great misfortune if the bill was to abrogate them. The great difficulty, however, was in framing clauses to meet the question. How far it might be necessary to have a central power was a question for deliberation. In his opinion there were no grounds of objection to the constitution of some easy and accessible court of appeal. Mr. Edwards was aware of the means which existed for taking up money on loan, but wished the difficulties which stood in the way to be removed.

Mr. MORRIS S. OPPENHEIM (Jews' and General Literary and Scientific Institution) considered that the question of borrowing money on debentures was one of great magnitude, and deserved their serious consideration, and he thought that it would be injudicious to ask Parliament for such powers at the present moment.

The CHAIRMAN then put the following resolution, which was unanimously agreed to:—"That the deputation be requested to confer with Mr. Hutt on the subject of obtaining the insertion of borrowing powers."

The CHAIRMAN said he ought to mention that the Council had been deeply indebted to the kind exertions of Mr. Lumley, who had made out the draft of the bill. That gentleman had taken great pains in the matter, and had had interviews with Earl Granville and Mr. Cardwell. As Mr. Lumley was a good lawyer, there was no doubt he would be able to introduce a clause embodying the resolution just passed. The deputation could also call the attention of Mr. Hutt to this point.

Mr. BAINES thought the meeting ought to express their gratitude to Mr. Hutt for bringing forward this bill, and their concurrence in its general objects.

Viscount EBRINGTON thought that any such resolution should include the name of Mr. Lumley. All those who knew the expense which was usually incurred for professional men, would see that the thanks of the meeting were eminently due to Mr. Lumley, for his attention and the application of his experience.

The CHAIRMAN then put the following resolution, which was carried unanimously:—"That this Conference approves of the general provisions of the bill, and desires to express its thanks to Mr. Hutt and Mr. Headlam for taking charge of it in the House, and to Mr. Lumley for his gratuitous services in its preparation."

Mr. PAYNE (Bath) drew attention to the Exemption Act, and to the decisions in courts of law with respect to it. Many institutions—that, for instance, which he represented—possessed news-rooms; and it was held that, under such circumstances, no institution of the kind was entitled to exemption.

Dr. BOOTH rose and moved that, as there had been two hours applied to this branch of the business, the meeting should proceed to the consideration of other matters.

After some further discussion, the following resolution was carried:—"That when the bill now before Parliament be passed into a law, the Council take measures for bringing before the House of Commons the desirability of having the law relating to the exemption of institutions from rating more clearly defined."

EXAMINATION OF INSTITUTE CLASSES.

The CHAIRMAN, in reference to the examination of pupils of Institute Classes, said he did not know whether the Conference wished the paper to be read over, 341
which had been published in the Journal, but perhaps the most convenient mode of proceeding would be to take it paragraph by paragraph. The paper was thrown out for the consideration of the institutions themselves. The Council would not embark in the matter if the institutions did not think it likely to be beneficial. They had heard the names of those distinguished men who had expressed themselves as willing to act as examiners. Since that paper was published a communication had been received from Lord Ebrington, in the form of a letter, 555
which had appeared in the last number of the Journal. Most of those present had no doubt read what Lord Ebrington proposed. His lordship proposed that the scheme which the Council had suggested for existing Mechanics' and Literary Institutions should be extended, so as to meet the wants of the agricultural districts. Perhaps it would be best, in the first instance, to hear any general observations as to whether it was expedient that the Society of

Arts should constitute a scheme for the examination of Classes in Institutes in Union.

Mr. R. MEDWAY MUSGRAVE (Whitehaven) thought the first thing should be to form classes for young men, on subjects on which they had had little opportunity in their younger days of acquiring knowledge, thus pushing a progressive system to a further extent. As a schoolmaster he had witnessed with much pleasure the advantages of a system of examination for teachers and pupil teachers. He proposed that a certain standard should be fixed, and that any persons studying in such institutions should be examined by men in whom the country had confidence.

Mr. JOHN WHITWELL (Peterborough) wished, before Lord Ebrington rose to speak, to know how he would apply the proposed prizes in agricultural districts? How were these prizes to be distributed among young men who knew nothing of competition in such matters. Agricultural societies did all they could in the way of sheep-shearing, but until they had the means of more elementary education it would be absurd to propose prizes in the Arts.

Viscount EBRINGTON admitted it would be impossible to propose prizes for persons who did not come up even to what the Council recognised, which he himself thought was too limited. He thought the system was susceptible of expansion.

The CHAIRMAN thought the best course would be to take up the plan proposed by the Council. It was for the Conference to decide whether they wished to entertain it or not. Lord Ebrington proposed the extension of the scheme to purely agricultural districts. The general question was whether the Society of Arts should adopt this mode of examination for the Classes of Institutes in Union.

Mr. WHITWELL observed that the agricultural districts wanted some such scheme more than any other. The farmers themselves were opposed to progress in education, and therefore these districts especially required such examinations.

Dr. BENSBACH (Galway) considered that all educational institutions were colleges for the people, and especially for the humbler classes. They must see how the examinations were worked in the Universities, and upon that system they should improve or adapt examinations for the humbler classes. The examinations should be adapted to modern science. He begged to state in general terms his approval of the suggestions made.

Mr. FOX, M.P., thought everything must depend on the mode of action by which the studies would be regulated, and the examinations carried on. He would avoid the common system, by which the pupils might read up, or be "crammed" for some particular branch. There were institutions which were becoming nurseries for young men who furnished patterns, or were supervisors in large establishments, and in other situations of confidence and skill, and who would serve as a sort of guides; and the welfare of such young men must be materially affected in after-life from the tone of their education. He was led to this view of the case from actual inspection in the town of Oldham, and by his connection with the Oldham Lyceum. These young men were almost all of superior minds; they were not labourers, but men who were destined to become an intermediate body between the mere labourer and the capitalist, and who were prepared for advancement in life.

Mr. BREWTNALL (Warrington) said there was a great want of some such system as that proposed. It was always felt that the classes of institutions were like a rope of sand. Some mode of examination was required to keep them together, and to give instruction a current value. It was found that young men had no credentials to show that they had pursued a certain course of study. All this must be looked to before they could arrive at any good results, and the system must be brought down to the level of small towns.

Mr. T. J. PEARSALL thought that whatever was done in the cause of education should be in itself good. Communication should be kept up between large and small towns, or how could it be known what was required. With respect to the agricultural population, a great deal of misapprehension prevailed. It would be found that some of the brightest institutions belonged to the agricultural population. He would not speak for all England, but such was the fact in Yorkshire, especially in the North Riding.

Mr. SLANEY could not but believe that the granting of diplomas and degrees to persons of the middle and humble classes would be productive of the most beneficial results, if carried out with care and discrimination under the auspices of the Society of Arts. He thought so for the reasons so ably detailed by the honourable member for Oldham. He thought it would give to spirits of intelligence now cast down, the means of stepping forth and showing the talents which were latent within them. It would enable them to see that the popular institutions of the country were not of a depressing character to those who were struggling with the difficulties of life, and who were pursuing their education under unfavourable circumstances. They would thus be enabled to stand forth and have their talents tested, and to become possessed of a credential that might be of the highest value to them at some future and perhaps not far distant day. He would not now enter into the details of the plan, which he believed to be worthy of the minds from which it had emanated. One result he had no doubt would be to bring forth men who would otherwise have remained in obscurity—to remove discontent and discouragement from a multitude of struggling minds in the towns and in the agricultural districts of the country. Seeing the active energies of the Anglo-Saxon people around them—seeing the advances that were being made by their fellow-creatures, those even in humble situations, if they had inherent talents, would desire their development. He thought this plan would be of great assistance to them, and when the stamp of merit had been conferred upon them, many in the higher walks of life would be found willing to assist them.

Mr. E. BAINES would be very glad to concur with the honourable gentleman who had just sat down, as to the general principle of the proposed examination of pupils; but he confessed from what he knew of mechanics' institutes in general, he was afraid there were many practical difficulties in the way of its being successfully carried out. They were much indebted to the distinguished gentlemen who had consented to act as the examiners, but he feared the list of subjects was much too ambitious for anything he knew of the vast majority of the mechanics' institutes of the country. He believed in the Yorkshire Union they might have a few students for examination in the proposed branches of learning, and there might also be a few in the county of Lancashire, but he doubted whether there would be more than a dozen institutes in those two districts from which pupils would be forthcoming for examination. He was therefore afraid they would be undertaking that which, although a most desirable thing in itself, would fail from want of support, which might discourage future operations of a valuable kind. In the first place, he thought the standard of examination was much too high, and that for the great bulk of the mechanics' institutes it must be brought down considerably. He concurred, upon this subject, with the observations which had fallen from the gentleman from Warrington. They were to remember that in the evening classes it was not often that the pupils remained for any length of time. He agreed with the honourable member for Oldham, that it was desirable to encourage these studies, but on the other hand they might discourage them if they placed the standard of examination too high. If they sent round a number of men distinguished for their learning, and they found an extremely small number of pupils offering themselves for examination, he feared it would be regarded as a great failure. One other remark—that was, whether the thing might not be more successful in the present

condition of mechanics' institutes in general, if the provincial unions undertook such examinations? There were at present unions in Yorkshire, in Lancashire, and Cheshire, in the Midland Counties, and, he believed, in the South-Western district. He would suggest whether it might not be more practical for them to undertake this examination, rather than the Society of Arts? He admitted that the end was most desirable, but he feared, in the present state of mechanics' institutes, they would not find a commensurate amount of success.

The CHAIRMAN wished to explain that the Council of the Society of Arts had no desire to interfere with anything that might be considered as coming within the sphere of the provincial unions. If it was considered by the Conference that diplomas granted by the provincial unions were more acceptable, and would produce greater fruits than those granted by the Society of Arts, he would say by all means let them withdraw from the thing. (No, no.) They only wished to take this upon themselves if it was the opinion of the Conference that they could do it the best. He, however, might say for his colleagues of the Council, that were men who were not easily discouraged: they had most of them lived long enough not to expect enormous results, and they were satisfied if they could set up a tendency in a right direction. He believed it had occurred throughout the country, that persons not finding it expedient to go to a university, had expressed a wish be able to present themselves before some tribunal, from whom they could obtain some record of their attainments. He believed it had operated most benficially in the case of schoolmasters, as had been mentioned by a gentleman that day. He had borne testimony to the fact how much the status of that profession had been improved by the examinations that had been instituted. But there was another view of the case. What was the condition of the schoolmasters who declined to submit to the governmental examination? They had been somewhat depressed. Now, if there could be some other body before whom schoolmasters might go for examination, and from whom they could obtain the same testimonials of their acquirements as were now granted under the government plan of examination, he (the chairman) considered it would be very desirable. Whether in towns or villages, it appeared to him that some such stimulus as was now proposed should be available, and he thought it was but an act of justice that the means should be afforded them. Then, again, it was suggested, that the standard of examination was fixed too high. He thought there was some little misapprehension upon this point. Gentlemen would see, from the list propounded, that the examination was quite encyclopædic. The list had been drawn up by the Education Committee of the Society, consisting of Lord Ashburton, the Dean of Hereford, and the Rev. Canon Moseley. The Council ordered it to be printed, and a copy to be sent to each of the examiners, in reply to which the Council had received three letters containing criticisms upon the list. Those letters the Council had directed should be communicated to the Conference. One was from the Rev. J. P. Norris, Inspector of Schools—a gentleman of great experience in the instruction of youth; another was from Mr. Sandford, Assistant-Secretary and Senior-Examiner in the Privy Council Office; and the third was from the Rev. Dr. Booth, a member of their own body. Those letters would be read to the Conference, but he cautioned them to this extent—that although it was thought desirable that the examination should go so low as to afford to persons of humble attainments an opportunity of obtaining a certificate of those attainments, yet that it should go so high as to give those possessing superior attainments an equal opportunity. If that plan were adopted, he had no doubt they would find persons coming before them, who, not having been at the Universities, would nevertheless exhibit attainments as high as those who had obtained degrees at the Universities. With this explanation, he begged to call upon the Secretary to read the letters from the examiners to which he had alluded.

Mr. BAINES did not intend, for a moment, to place diplomas granted by examiners of provincial unions in competition with those granted under the auspices of the Society of Arts. He felt that the certificate of the Society of Arts would be incomparably higher. He referred principally to the physical difficulties that would attend the plan proposed.

The CHAIRMAN—that was a misunderstanding entirely.

Mr. BAINES added, that it was not from any jealousy of the Society of Arts that he had mentioned the matter, for he was ready to subscribe to the great value of the diploma of the Society of Arts. Let him not be understood as throwing any discourtesy upon that Society, as he simply intended to caution them not to institute too high a standard of examination, regard being had to the present condition of the bulk of the Mechanics' Institutes.

The Secretary then read the following letters:

9, James-street, Westbourne-terrace, June 26, 1854.

SIR,—I beg leave to offer the following remarks on the Classified List annexed to your circular of the 21st inst.:—

The manner in which the various subjects in the first four groups are arranged sufficiently proves that the object of the Council of the Society of Arts is to encourage *practical* study; but unless they wish to give their examinations a purely *popular* as well as practical character, it would be well, I think, to encourage, by a subdivision of the first head, a more scientific basis of study in connection with these examinations.

The term "Mathematical Sciences," by which the first group of subjects is designated, is certainly an awkward one, and becomes doubly so when (as in the explanatory note) arbitrarily restricted to the most elementary branches that can be comprised under it as a general head.

It may, further, be asked in connection with this class of subjects to which it is here confined, how far the practical study of geodesy, &c., can be carried out, without some acquaintance—however elementary—with conic sections and trigonometry (plane and spherical)? or, how far the nice geodetical measurements, and mere abstruse calculations in nautical astronomy can be worked without a knowledge of the calculus?

Granting, however, that the latter questions are excluded from the range of topics to which your examination may extend, I think some provision ought to be made in the syllabus which you publish for the encouragement of the study of pure mathematics to an extent which may enable members of the Institutes which come within the range of your operations to enter on the second of the branches named under the second, third, and fourth heads with greater chance of profit to themselves and others, than if they take them up either experimentally or with a mere smattering of first principles.

With this view I would venture to suggest that the *first* head should be subdivided thus:—

1. *Pure Mathematics*, including Algebra, Geometry, Conics, Trigonometry, plan and spherical, with their applications, &c. (as at present.)

2. *Mixed Mathematics*, including Mechanics, Hydrostatics, Common Optics, Astronomy.

As your list now stands you *appear* to discourage the purely scientific treatment of such subjects as Mechanics, &c. By adopting the addition (mixed or applied Mathematics), which I have suggested, you do not preclude the older and practical student from offering himself for a more popular examination on subjects chosen from the second, third, and fourth heads (as they are now numbered), while you further offer an opportunity, and a motive to the younger members, for laying such a foundation of pure mathematical knowledge as will greatly facilitate their future progress in the study of the Mechanical Sciences, as well as be of incalculable benefit to themselves and others, in following up the occupations of their everyday life and business.

It should be remembered, that if the prepared scheme answers you will not at these examinations have to do with men who, as at the University, will come up at the end of a three years *set* course of study with a certain amount of knowledge crammed *for the occasion*—to be thrown aside with the last paper that they work; but your students will be students *for life*, votaries of a science which they may have selected for themselves, or practically interested in it, as bearing upon the employment by which they gain their livelihood. It may, therefore, I think, be deemed worthy of consideration whether it would not be useful, and consistent with your general scheme, to give such a stimulus as an opportunity of examination affords, and a place in your syllabus suggests, to the study of pure principles, as well as of the results of their practical application.

With respect to the second and fourth heads, it might be well to write "*Common* and Physical Optics" in the former, and to *specify* "Hydrostatics" as a branch of the latter.

The Laws of Heat might be specified under the second head as a subject for study.

Is the term "Social Science" sufficiently definite, or so universally received as to warrant its being named as *one* of "The Social Sciences?":

Would it not be possible to specify the various branches under which the Council propose that the subjects of examination in 6, 7, and 8, should be arranged? Such details would appear to be more required (with the view of shewing the object of these examinations) in the later than in the earlier heads of your list.

It may also be suggested, that it would perhaps be advisable to name certain text books (as in the case of the Ashburton prizes, and those of a similar character instituted by the Dean of Hereford)—NOT to be *got up;* but as indicating the nature and extent of the information that will be looked for in candidates who present themselves for examination.

I am sorry that a press of urgent business has prevented me giving as much time as I could have wished to the consideration of your letter before sending you this reply. As it is, I shall be only too glad if it should be of any service in furthering the object which you have in view.

Yours very faithfully,

FRANCIS R. SANDFORD.

Council Office, Whitehall, Tuesday, 27th June.

SIR,—I have the honour to acknowledge your circular of the 21st, asking for my remarks upon the annexed schedule of class examinations.

The schedule is intended, I conceive, to cover the field of subjects likely to be most generally taught in the educational Institutes of the country.

In thinking over the several towns of the district with which I am best acquainted, (Cheshire, Salop, and Staffordshire) it occurs to me at once that many of them would not find their specialities properly represented in your list.

For instance,

Mining Science and *Metallurgy* should occupy a prominent position.

I would suggest that Sir Henry de la Beche should be applied to for advice upon these heads. They could hardly be ranged under any one of the first four categories of science, as they draw more or less from all.

Again,

The Science of Agriculture should be specially marked out as a subject for examination. In many of the Institutes with which I am acquainted, it is the most popular subject for lectures.

Again it occurs to me that what may be termed *Sanitary Sciences* do not find their proper place in the list.

In the Stourbridge Institute, a most attractive course of lectures was given on this subject, including ventilation physiology, pathology, anatomy, sewerage, &c.

Above all it strikes me that the most popular and the most truly educational of all the sciences—the *Science of History*—is by no means properly put forward in the list.

One of the greatest faults of modern education, is the very unscientific way in which this subject is taught.

In many of our educational institutions it is altogether neglected.

Other sciences may make us clever and productive as a nation, but it is history emphatically that makes a nation *wise*.

As we value national wisdom we should value the study of history. And therefore I earnestly hope that in framing this list, which is sure more or less to shape the course of instruction in our Institutes, history may be brought prominently forward, and as I believe history to be by far the safest vehicle for instruction in political economy, polity, and many of the social sciences, I would suggest that these should be ranged under this head.

I am Sir,

Your obedient servant,

J. P. NORRIS.

Vicarage, Wandsworth, 26th June, 1854.

SIR,—Having examined with some care the division of the subjects of human knowledge to be proposed for the consideration of the ensuing Conference of our Society with the Representatives of the Institutions in Union, I cannot but think that, while retaining the division under eight heads, their logical sequence might be arranged with somewhat more propriety in a different order. Thus Mechanics, whose principles depend neither on observation nor on experiment, but on mathematical reasoning, should be placed in close sequence to Mathematics. Again, Observation, in theory at least, must go before Experiment; and the principles of Social Science, which are nothing more than the faculties, emotions, and affections considered as practically in operation in communities of men, ought previously to be discussed, as constituting the nature of the individual man, under the heads of Metaphysical and Ethical Science.

It is, however, impossible to attain to one of the essentials of logical division in this case, I mean distinctness, because subjects of thought and feeling touch in so many points while they diverge in others—they may be contemplated from so many different standing points, that it becomes quite impossible to group them with logical distinctness under a limited number of well defined heads. Thus, for example, if we take Light; the elementary phenomena, derived from common observation, suggest theories which, developed by a refined mathematical analysis of the very highest order and of the most abstract kind, cannot be verified without experimental researches, which for successful prosecution must depend on the nicest adjustments, and the most perfect mechanical combinations in the instruments employed; while these in their turn supply the elements of new mathematical investigations. Thus we proceed, *ascendendo et descendendo*, as Bacon says, by ascending to principles and descending to experiments.

Again, the intellectual endowments and the moral qualities of the experimenter, such as sagacity, coolness, patience, and good faith must be taken into account; the normal state of his physical senses will likewise have its weight. Thus, the peculiarities of the individual mind will unavoidably tinge, so to speak, with coloured light every subject of thought, every train of experimental inquiry. This, beside the object in hand, will serve I think, clearly, to show how much a disseveration of the branches of human knowledge is to be deprecated, and that nothing could be more deplorable in its results than any widespread system of examinations which should foster the cultivation of any one department of science—mathematics suppose—to the exclusion of the rest. This, in my opinion, amply justifies the wide range of subjects proposed for examination by the Council of the Society of Arts. They do not of course contemplate that any can-

didate should be examined in all these subjects, or even in the greater part of them. It is their object, I doubt not, to provide a system so extensive that no one who may have turned his attention to the study of any ordinary department of human knowledge, shall be excluded from the right of having that knowledge tested and stamped with the mark it deserves to bear.

I am, Sir, your obedient Servant,

JAMES BOOTH.

The Secretary of the Society for the Encouragement of Arts, Manufactures and Commerce.

1. Mathematics, pure and applied.
2. The Mechanical Sciences.
3. The Sciences of Observation.
4. The Experimental Sciences.
5. The Fine Arts.
6. Metaphysical and Moral Sciences.
7. The Social Sciences.
8. History.

Under "pure mathematics" are included the properties of space considered graphically and numerically, or geometry and algebra, with their developments, such as projective and descriptive geometry, the quality of the properties of space, the conic sections, trigonometry, logarithms, the calculus, &c.

Under "applied mathematics," sometimes called mixed mathematics, are included the applications of pure mathematics to establish the elementary principles of statics and dynamics, whether of solid or fluid bodies, and to develop the consequences of the assumed theories of plane, nautical, and physical astronomy, of geodesy and navigation, of heat, light, and sound.

II. "Mechanics."—Under this head are contained practical mechanics, the theory of machinery in motion, carpentry, shipbuilding, architecture, the construction of canals, docks, and bridges, &c., economy of materials and labour.

III. The "Sciences of Observation" include astronomical and meteorological observations, physical geography, geology, mineralogy, zoology, comparative anatomy, physiology, and botany.

IV. The "Experimental Sciences" may be assumed to comprise chemistry, electricity, magnetism, metallurgy, photography, with the manufacturing processes dependent thereon.

V. The "Fine Arts" may be taken to include drawing, etching, lithography, painting, sculpture, printing from nature, &c.

VI. "Metaphysical and Moral Sciences" group together logics, the art of reasoning, the powers of the human understanding, ethics, the various systems of morals, ancient and modern.

VII. The "Social Sciences" may be taken to comprise the principles of legislation, political economy, sanatory science, education, industrial pathology, or the nature and treatment of trade diseases, &c., &c.

VIII. "History," in its wide acceptation may be said to comprise the knowledge of the progress of mankind both physically and mentally, and will thus include history, properly so-called, whether ecclesiastical or civil, poetry, oratory, and the drama, biography, chronology, the history of the advancement of science, of arts, manufactures, and commerce.

Rev. J. H. RYLAND (Bradford Mechanics' Institute) said he had that morning received a letter from the officers of that institution, requesting him to attend this Conference, and although his name had not been sent in amongst the representatives, yet the Secretary had kindly passed him into the Conference. With respect to the subject under discussion, he thought it one of the greatest things that could be done. It would raise the character of the institutions and give them an object. He thought the difficulty suggested by Mr. Baines would work its own cure, for as soon as the standard was placed before the institutions it would have the effect of raising their means of education. His own observation enabled him to say that where prizes and certificates of merit were awarded, a much greater impulse was given to study than where no such incentive existed, and he considered that one of the best features of the institutions. From the experience they had of the influence which the exhibitions of the University of London exercised all over the country, it was a guarantee that the same effects would follow by raising the standard of the education given in the institutes. At the present day they found that amateur lectures were for the most part directed to some literary subject, rather than to practical scientific matters, which in a great measure was owing to the defective scientific education in our towns. The object of the Yorkshire Union of Institutes had been to obtain scientific lectures at a low rate; but in this they had not been successful. He looked upon the present proposition as one calculated to give an impulse to every branch of education in connection with the institutes of the country. In his own institution they had classes for arithmetic and algebra, and a degree in mathematics had been established, which had succeeded remarkably well. He was certain that if the plan of examination of pupils were carried out, it would have a most beneficial effect upon all the kindred institutions of the country.

The Rev. A. BATH POWER (Norwich Young Men's Institute) said, he rose with a view to give a practical turn to this discussion. He had been somewhat anticipated in his remarks, but he might be allowed to say that he had taken a deep interest in this movement. From observations he had made in his district, he found there was a complete absence of stimulus to learn in the great mass of the people, though it might be met with in many of the superior elementary schools. As had been stated to-day, a great advance had been made in the status of the schoolmaster, and the progress was further indicated by the number of pupil teachers. Yet he had observed many deserving youths who fell below the standard required for pupil teachers, quite worthy of commendation, and, for want of encouragement and the absence of all stimulus, had neglected to carry on their studies. With regard to the pupil teachers in general, there was not sufficient employment for all, so that they also relaxed in their studies or abandoned them altogether; or, in other words they failed from the want of sufficient inducement to carry them on. It had occurred to him that one of the effects of this measure would be to offer an inducement to those young persons to carry forward their previous studies, and to persevere in the course on which they had previously entered. He regarded the object as one of great importance in that aspect. The tacit concurrence of the Conference having been given to the desirableness of the examination of pupils, he felt inclined to propose, as a resolution, that the arrangement and carrying out of the details should be left in the hands of the Council of the Society of Arts, inasmuch as they had initiated the plan, and they had also the entire confidence of the institutions. There was no doubt that they would carry it out in the way best calculated to promote the end in view. He took it, that communications would be made to the Institutions in Union upon the plans being matured, and that due notice of the proceedings would be given to the managing bodies in the various districts. Some apprehension had been expressed as to the mode in which the examinations should be conducted, and by some it appeared to be regarded as involving physical difficulties, in the examiners moving about from point to point But as he had understood it, the examinations would be conducted upon a plan similar to that adapted by the Committee of the Privy Council, viz., by sending down examination papers, to be distributed afterwards to the examiners in sets. He now begged to propose the following resolution:—"That the Conference cordially approves, and requests the Council to carry out their proposed system for examining and granting certificates to the students

of the classes of the Institutions in Union with the Society."

The resolution, being seconded, was put by the chairman, and carried unanimously.

The CHAIRMAN wished to say that the Council felt highly indebted to those eminent gentlemen who had kindly undertaken to act as examiners,—(cheers)—and, at his suggestion, the following resolution was unanimously passed:—"The Conference desires to thank the eminent persons who have consented to act as examiners."

At the call of the chairman,

Viscount EBRINGTON said—being agreed as to the desirableness of instituting examinations of students in the classes of the Institutions in Union, he would ask the attention of the Conference for a few moments whilst he explained that the agricultural districts were under considerable disadvantages as to the quality of the education they would receive for the same sum of money, as compared with cities and large towns. In the schools at Norwood, an excellent education was given, including industrial training to some extent. 1,000 children were educated there, at an expense not exceeding 12s. per annum each scholar. But in the agricultural districts, owing to the sparseness of the population, the case was very different, and they must either pay more for their education, or get less for the same payment that was made in the more densely-populated districts. They must necessarily be on the spot where their work lay; and for that at present there was no remedy. It had occurred to him, that it was not desirable that they should have two sets of machinery to do one and the same thing; that was, not to have separate local examinations for the agricultural districts. Therefore he would venture to suggest to the Conference, that they should affirm the principle of extending, if possible, to the agricultural districts, which could not, by reason of the sparseness of the population, support a mechanics' institute, the benefits which were secured by a union of provincial institutions; so that by a consolidation of means both classes might obtain more than they could do separately. For instance, Mr. Baines had very properly suggested that there were physical difficulties to be overcome. With the present funds and means there might be difficulties; but, supposing they had more funds, instead of working by examination papers, they might have *viva voce* examinations, which were far more preferable in every point of view. He would not detain the Conference longer than to propose the following resolution:—"That the Council be requested to prepare a plan for extending to the inhabitants of rural and other districts, where the establishment of mechanics' institutions is difficult or impossible, the benefit of connection with this Society, and of the local examinations proposed to be established by the Society, in concert with the local Institutions in Union with it." His lordship added that he could bear testimony from his own knowledge to the accuracy of the statement of the representative from Bramley, that there had been considerable educational development in the agricultural districts; and as to the readiness of the population to take advantage of these institutions, particularly in the case of lending libraries—the beneficial working of which he believed could be borne out by the representative of the Hants and Wilts Society, who he was happy to see present on that occasion.

The Hon. and Rev. S. BEST seconded the motion, and said, the Hants and Wilts Society had proposed a plan by which, as he hoped, the reading rooms and associations of both counties might be brought within the range of the examinations, which he trusted would be carried out in their full spirit. They already had had some instances of the most striking success. Large sums had been raised to form institutions, and large numbers were joining them, and they were being carried out with a spirit that would do honour to any institution. Led by the hopes thus inspired, they had during the last six months received into Union 40 local institutions. (Hear.) Every one who knew the success which had attended their efforts would, he hoped, give them a right to expect that they would be able, year by year, to show a much larger increase, especially as they had associated with them in the work several persons of distinction, and above all H.R.H. Prince Albert, who had graciously allowed himself to be named their President.

Mr. George DAWSON wished to know whether, by approving this resolution, they pledged themselves to the whole of the propositions contained in Lord Ebrington's letter, as he altogether objected to the principles enunciated in the latter paragraphs.

The CHAIRMAN did not consider that they were so bound, and as far as the Council was concerned, he begged to state that they neither expressed approval nor disapproval of his lordship's propositions.

Mr. DAWSON repeated that he agreed with a large portion of it; but not with the latter paragraph.

Viscount EBRINGTON said it was his intention to put the latter part before the Conference, but not on that day; but it was no reason that because they might not coincide with a second proposition they should decline to agree to the first.

Mr. SLANEY suggested that the examinations should consist of such questions as the persons would be able to answer. He had the honour to belong to the Royal Agricultural Society, and from his experience he could say that they would, by suitable questions, bring out a great deal of latent talent in the rural population. If they went to Norwood they would see boys in the school there taught to manage horses, and he considered that it would be productive of the greatest utility, if those who were to attend to those noble animals received some instruction in the matter. He would only mention this as one of the subjects on which they might examine, but he also thought that it would be well that they should have some knowledge of local statistics.

The CHAIRMAN then put the resolution as above, which was carried unanimously.

Viscount EBRINGTON then said, that the second point which he had to bring before the Conference, was the expediency of forming some moderate standard, which would be considered as the amount of education befitting an Englishman of the middle classes. He should make it indispensable to the attainment of the diploma which would certify to that amount of education, that the candidate should first pass in the first rank his examination in the ordinary branches of a plain education.

His Lordship then moved—"That the Council be requested to prepare a plan for the purpose of framing a system of examination for the degree of graduate, to serve as a standard of acquirement befitting an educated Englishman."

Mr. BUCKMASTER wished for some explanation as to the degree of education which his lordship would require—as he feared that if they made it necessary to obtain one degree before being qualified for another, it would prevent young men exerting themselves in any particular branch of science.

Viscount EBRINGTON replied, that the following passage from his letter would best explain his meaning:—"Reading fluently and correctly, writing correctly from dictation, an elementary knowledge of grammar, good penmanship, an elementary knowledge of arithmetic and book-keeping, and a general acquaintance with the outline of English history, and of the geography of the British empire."

Mr. BUCKMASTER thought that the subject ought to be discussed in the Journal before the Conference took it into consideration.

Viscount EBRINGTON said, that the proposal was very simple. It was merely to make the possession of the diploma, attesting the higher order of education, contingent on the candidate's having undergone the first examination.

Mr. BUCKMASTER was of opinion that the qualificat-

for the first degree should be merely reading, writing, spelling correctly, and some knowledge of the English language. He disapproved of what was called "making up" a subject, and likewise of discursive reading, from which they could never get any sound knowledge.

The CHAIRMAN stated that the subject before the Conference appeared to him to be very important indeed. He understood it to be, that at the earlier examinations, they should grant certificates of the first, second, and third class, to those who might show an ordinary acquaintance with the subjects: but that afterwards the Society should not grant the higher diplomas to any person who had not previously obtained the first-class certificate at the earlier examination.

The Rev. Dr. BOOTH thought the difficulty was provided for by the examination itself, as he did not think that a person who could not read correctly, and go through an arithmetical calculation, would present himself for examination in branches which were more advanced.

Mr. WHITWELL would be sorry to risk the system of examination by overlaying it. When he looked at the increase of machinery in the rural districts, and the rivalry between them for the display of their machinery, he could not but think that it would be advantageous to direct the examination of persons connected with the rural population to the knowledge of the construction of such machinery. Such an examination would give them a practical turn, and make their knowledge of use to the locality. He hoped, however, that the present proposal would not be persevered in, as he thought that they should first see that the people were capable of receiving that amount of education which it was proposed to give them.

Mr. W. J. FOX (M.P.) said, that if he understood the question aright, it was that a certificate in a knowledge of history or mathematics was to be contingent on the possession of a degree of a certain character.

The CHAIRMNAN did not so understand it.

Viscount EBRINGTON said, it was just like in the Universities, where, although a student might obtain a prize for poetry, he could not yet have his degree without going hrough a prescribed course of study. There was a distinction between the prize for the specialty and the diploma for general proficiency.

Mr. W. J. FOX (M.P.) thought it rather hard that the granting of the first-class degree should be at all contingent, because it should be remembered that they had to to with men whose minds were not all equally fitted for instruction in the same subjects. Some time past, the Norwich weavers had the reputation of being great mathematicians; and he recollected when the mathematical questions which appeared in the Cambridge Examination Papers used to be all solved by those weavers. These men were all self-taught, and it was not to be supposed that their attainments in other branches of knowledge was correspondent with their acquaintance with mathematics. He was the other day, for some time, in the establishment of a friend of his—an ironmaster, who had set apart a room as a library for the use of his men, and he felt gratified in stating that of the 1,000 volumes in the catalogue almost every one was out for reading; but it was still more gratifying to him to see their slates lying about. He turned some of them up, and was surprised to find that the men had been working problems in quadratic equations. Was it likely, then, that men busily engaged in employment, and who devoted their leisure to a study of mathematics, would stand an examination in any other branch of education. There was another matter which, with their indulgence, he would now notice. He said that they proposed to conduct the examinations by written questions. One disadvantage of that would be, that the examination would be considered a test of what could not be expressed on paper. He found among the list of examiners the name of Mr. Sterndale Bennett, but it did not appear what he was to examine on.—(Chairman—Music.) Well, he thought that it would be hard to test musical proficiency on paper. In reading, too, he could not see how written questions were to be a test of proficiency. That perhaps was a slight thing, but, in his opinion, good reading had a most important bearing on the sense of the composition, and on its logical correctness. All the appreciation of the beauties of poetry depended on it. He wished that it was more attended to and better cultivated in all our schools. But, to revert to his proposition, he did not think it fair that men who might have attended to a particular branch of study, should not be able to obtain a first class degree for their knowledge of it.

The CHAIRMAN said that to send examiners round to the different institutions would involve a heavy expenditure. He certainly concurred in what had fallen from Mr. Fox, that they should afford a man the means of showing what he might have acquired—if even he should only happen to be thoroughly good in one thing. What he understood Lord Ebrington to propose was, that the Institution should fix a standard of acquirements, to which whoever came up should receive a degree from the Society, stamping him as an educated man. Whether they could do so or not, and make it equivalent to a degree given by the Universities, was a matter of opinion. They should, at all events, have the ground clear for their doing so.

Mr. FOX said that he had intended to suggest some arrangement by which the Government Inspectors of Schools should conduct the *viva voce* examinations, and that had led him to overlook the question of expense.

The CHAIRMAN said, he had some knowledge on the subject, and he knew there was already a difficulty in keeping the staff of inspectors up to the mark. It would be impossible to provide further examinations through inspectors.

Mr. T. J. PEARSALL said he had been a teacher in Yorkshire, and he would point to a case which had lately occurred. A student in the London University told him that he was going up for the last medal, and he found that the most rapid writer, who was enabled to give in his answers quickest succeeded, though the really more clever man was passed over. This party declared, that if he himself succeeded he would have the whole system altered.

The CHAIRMAN asked the meeting whether they wished to accept the proposition which had now been discussed?

Mr. SLANEY thought the scheme was one which was so extensive in its range, and the difficulties which surrounded it were so great, that it would be best to withdraw the proposition for the present.

Viscount EBRINGTON had thought it was a subject which the Conference might have entertained, if time allowed them to do so. He only wished to promote the education of all classes; but seeing the undesirableness of any division of opinion on the matter, he would, with the permission of the meeting, withdraw his resolution.

Mr. E. BAINES here stated, that it would not be in his power to accompany the deputation to Mr. Hutt;—if he remained in town to do so, it would be a serious inconvenience to him.

The CHAIRMAN suggested it was possible they might see Mr. Hutt at the Conversazione in the evening.

It was then proposed that Mr. Hole and Mr. George Dawson should supply the place of Mr. Baines, which was agreed to.

PARLIAMENTARY PAPERS.

The CHAIRMAN said, the next point for discussion was as to the granting of Parliamentary Papers to Literary and Scientific Institutions. Gentlemen were all aware, he presumed of the resolution which was passed at the last Conference, that it was expedient that these Institutions should receive the Parliamentary Papers. The illness of Mr. Tuffnell delayed the bringing the matter before Parliament, and he asked Mr. Hutt to bring it before the House of Commons, but circumstances had induced him to postpone the subject till the present Conference, and it was now for them to consider whether it was desirable that Institutions should have these papers.

Mr. Fox, M.P., thought it would be practicable to select certain Parliamentary Papers, and to make out and print a list which could be inserted in the Journal of the Society. There might be added to the list the price of each Paper, and a brief statement of its contents; they would thus have a very important catalogue of the documents as they appeared from time to time. The price at which these Papers were published was so low, and the documents were so accessible, that he believed these were the reasons why they were not more read. The reason why the vast information which they contained was not more generally appreciated, was the want of knowledge in the institutions of the facilities of obtaining such valuable additions to their libraries.

The Chairman said the proposition of the honourable gentleman would involve the purchase of all the Parliamentary Papers, and the finding a place to keep them in. It also involved the necessity of employing some one to read them through, which would be a severe task.

Mr. Slaney thought that some intelligent person could be found who would merely scan over these blue books, many of which were of little or no use, whilst some of them would prove of the greatest utility. He knew that many of them were put aside as useless; but the Educational Reports, and the Reports of many of the Committees, would very much interest the Society and those in connection with it. The real matter of many of them might be printed on small slips, and be inserted in the Journal of the Society. There was hardly any man who knew how to get at the mass of information which was contained in these books. A little index also might be published.

Mr. W. D. Savage (Brighton) said, that the Institution that he represented was supplied with the Parliamentary Papers by their Member (Admiral Pechell). He thought that many of them were useless.

Mr. Morris S. Oppenheim was afraid that, if granted, they would have to provide a room for these blue-books, though they might be sold ultimately for waste paper, with the exception of the Reports of the Council on Education, and some printed by the Society of Arts. He believed that for eight years these books had never been asked for at the Institute which he represented. Indeed the contents of the more important books were copied into the leading Journals of the day.

The Rev. H. Hawkes (Portsea) should be sorry if it were to go forth that the institutions were not willing to accept these papers, and to put up shelves for them. He knew a case in which the value of these blue books was practically shown. When Colonel Portlock occupied the office of Vice-President of the Institution which he had the honour to represent, that officer suggested that a communication should be made to the British Association, then meeting at Swansea, on the statistics of the island of Portsea. The gallant officer, however, was suddenly called away on duty, and great difficulty was at first felt as to obtaining the required information; that, however, was found in one of these blue books, and the communication was made to the British Association.

Mr. Buckmaster (Battersea Institution) felt that the Reports of the Sanitary Commissioners—reports on epidemic diseases, the cholera, and the proceedings of the Board of Health, were all documents which would be read with the greatest interest by the Institutions. Again, there were the Reports of the Committee of the Privy Council on Education, which were most valuable; true, it was, that they might dispense with many of these documents; thus he did not think they were much interested in the reports of election committees, but there were many books which should be placed in the library of all literary institutions. Indeed, his own idea was to make these selected reports the nucleus of a free library. Let them look at the sanitary reports. If these were circulated gratuitously, the greatest benefits would result to the community. He, therefore, strongly recommended the Conference not to take all these reports, but to make a judicious selection from them.

The Chairman said the Council were not responsible for the recommendation of the Committee of the House of Commons, that a special room should be provided for the preservation of these books. He recollected it had been urged that the House of Commons should present these blue books to the institutions, not as a favour, but for the sake of the House of Commons itself. He conceived that nothing could be done in the matter, except by the will of the majority. As far as his own evidence went before the Committee of the House of Commons, it was that a judicious selection of these papers should be given unconditionally to the institutions. Questions, however, were suggested as to whether the magistrates should not be allowed to come in and look at the books. He, being a magistrate himself, replied that he thought they ought not to be allowed to do so, and that they should pay —(a laugh)—though, as a matter of courtesy, the institutions would be always ready to communicate their stores of information. It was now for the Conference to determine whether they would take any steps to meet the question in the House of Commons, or whether the deputation which was appointed to see Mr. Hutt to-morrow morning, should communicate with that gentleman as to the best mode of obtaining such books only as were suitable for their purposes.

The Rev. H. Hawes moved that the deputation now appointed, be requested to communicate with Mr. Hutt on the subject of granting Parliamentary papers.

Mr. Gowing (Ipswich) seconded the resolution. He thought a proper and judicious selection might easily be made, because the subjects would suggest themselves.

Mr. Baines said—His opinion very much accorded with that of the chairman. He thought the Government might grant these books, but he felt a great practical difficulty how out of the enormous number to make a selection, though the great majority of them were not of general interest. He would simply suggest that each Institution should have a committee of its own to obtain the grant gratuitously of such books as might be applied for. Many of these books would be of extreme value generally, while others would interest perhaps only one part of the country.

The Chairman then put the resolution that the deputation from this Conference be instructed to communicate with Mr. Hutt as to the distribution of these books and papers, which was carried unanimously.

List of Lecturers.

The Chairman said the next point was whether the Conference thought it desirable that a revised list of lecturers should be published and sent to the Societies in Union.

Mr. Paul Blackmore (Wandsworth) remarked that the publication of the list had been of the greatest benefit to the Institutions. The present one, however, was incomplete, as his Institute had employed five paid lecturers whose names did not appear, and he knew it to have been the case with other institutions.

Mr. J. Hole (Yorkshire Union) thought that the Council should carry out on a large scale what was done in the Yorkshire Union. It was a well known fact that the bulk of lecturers gave their services gratuitously; and the plan adopted in the Yorkshire Union was to furnish each Institution with a list of the gratuitous lecturers in various districts, with the names of the subjects on which they treated. That list was published in their annual report, and had been found to be of great service. They had had as many as 700 gratuitous lectures in the Yorkshire Union of Institutes during the last winter. (Hear, hear.)

The Chairman said that in the present list there were the names of some gratuitous lecturers, and there was nothing to prevent the insertion of others if they were communicated. The correctness of the list depended in a great measure upon the Institutions themselves.

It was moved, seconded, and resolved unanimously—

"That the Council be requested to revise and publish a new edition of the list of lecturers as soon as possible."

The MAYOR OF DERBY said, one great difficulty felt in the provincial Institutions was the want of a supply of proper subjects for copies in the drawing classes.

The CHAIRMAN said that matter would come on by-and-bye.

Mr. VALLENTINE said it would be extremely useful if the list of meetings for the week, given in the Society's Journal, could be extended so as to embrace the provincial arrangements. At present the notices were confined to the meetings of the Royal Society, the Royal Botanical Society, the Entomological Society, and all leading institutions in the metropolis, which it was almost impossible for the people of the provinces to attend if they had even so great a desire to do so.

The CHAIRMAN said the publication of the arrangements of the 355 Institutions in Union would occupy a very considerable space in the Journal, with which the importance of the thing would hardly be considered commensurate.

THE PARIS EXHIBITION OF 1855.

The CHAIRMAN, passing on with the business said, the next subject was an important one, and had reference to the Exhibition at Paris, which was to take place next year. There was a passage in the report calling attention to the minute of Council on the subject. They had suggested that arrangements should be made in the various localities, which would conduce to the economy and comfort of a visit by the artisans of England to that Exhibition, which it was anticipated would be one of a highly interesting character. He thought there was no difference of opinion as to the desirableness of promoting in every possible way the friendly intercourse which now so happily subsisted between this country and our great neighbour—(hear, hear)—and it appeared to the Council that the Institutions in Union would form an excellent organisation for making known to the artisans and the middle classes the opportunities that would be afforded for making a visit to the Exhibition in Paris. (Hear, hear.) If the Conference was of opinion that the subject was one worthy to be taken up he should be happy to receive a resolution upon it.

The Lord MAYOR of York said, having considerable experience as to what took place in the North of England, on the occasion of the Exhibition of 1851, he felt no hesitation in rising to ask the Conference to confirm the recommendation which had proceeded from the Society of Arts on this subject. He was sure the artizans of the kingdom would feel grateful to them for having taken the matter up; and, connected as he was with railways, he felt it important that the earliest opportunity should be taken for making arrangements with the managers. And he was sure the directors of the several railways would give the fullest opportunities for the masses of the people to proceed to Paris on the occasion of the Exhibition. (Cheers.) He begged to propose the following resolution—"That this Conference highly approves of the resolution of the Council of the Society of Arts with reference to the organisation of arrangements for enabling artizans to visit Paris during the Exhibition of 1855."

Mr. RUMNEY (Manchester Mechanics' Institute) seconded the motion, which was carried unamiously.

The CHAIRMAN announced that, in due time, a list of places at which committees were formed for carrying out this object would be published in the Society's Journal.

SPECIFICATIONS AND INDEXES OF PATENTS.

The CHAIRMAN then introduced the next subject—viz, the expediency of an application to the Commissioners of Patents for gratuitous copies of the specifications and Indexes of patents.

Viscount EBRINGTON said if that were done it might save many an ingenious man much expense and disappointment; and the "hope deferred, which maketh the heart sick."

The Lord MAYOR of York, expressed himself to the same effect.

Mr. RUMNEY thought the same objection would apply, as was made in the case of the parliamentary papers.

The SECRETARY remarked, that a classification was now going on, which would be extremely valuable.

The CHAIRMAN said they might ask the Commissioners of Patents to furnish gratuitously, to such Institutions as required them, copies of the indexes and specifications. He know there were many societies who would not care to have them—his own Institution, for instance. What he would suggest was, that the Council should communicate with the Commissioners of Patents, and endeavour to get them to consent to furnish copies to such Institutions as might have their names communicated through the Society of Arts.

The following resolution was then proposed, seconded, and carried:—"That the Council be requested to urge upon the Commissioners of Patents the desirability of presenting their publications to the Libraries of such Institutions as may apply for them through the Society of Arts."

MODEL DEED OF CONVEYANCE FOR SITES OF INSTITUTIONS.

The CHAIRMAN said, the next subject upon the paper was that of the expediency of a model deed of conveyance of sites for Institutions; but, perhaps, it would be better to wait and see whether the bill before the house was passed. At the same time he thought a model deed, as it was called, would be of little use, as what would suit one case would not meet another, each being dependent on its own circumstances. Then there was a suggestion that the Institutions should be made more educational. He thought that had been disposed of under the head of examination of pupils. Again, there was a suggestion that instruction on agricultural matters should be introduced, which was embraced under the same head. Again, there was a proposition as to the expediency of supplying the Institutions in Union with subjects for drawing at a cheap rate. He did not know whether they were aware of the facilities that were now afforded at Marlborough-house in that respect, but probably something more was desirable, and if a communication was made to the Council, they would do what they could to meet the wishes of the parties so applying.

The Mayor of DERBY complained of the want of subjects, for copying for the early students as well as for the more proficient in the art. They required a graduated scale suitable for all students.

The CHAIRMAN said possibly something might be learned from the Educational Exhibition, and the Council would make a note of it. Then there was a proposition with regard to class books—that class books should be published suitable for students in the Institutions: that was a very difficult subject to deal with. It was also suggested, that a cheap chemical apparatus should be provided for the use of Institutions. Then it was suggested that the taxes on knowledge should be brought under discussion. Upon that, he would say, the Council, acting upon the recommendation of the last Conference, collected a vast deal of information on this subject; and he believed, had it not been for the war, the Chancellor of the Exchequer would ere this have abrogated the tax, in concordance with his own known views upon the subject. It had also been suggested that the question of the decimalizing of the coins, weights, and measures of the realm should be discussed by the Conference.

DECIMALIZATION OF COINAGE, WEIGHTS, AND MEASURES.

The Rev. W. T. JONES said he believed that subject would not be taken up by the Chancellor of the Exchequer until there had been a strong expression of public opinion upon it, and then, no doubt, it would, like all other great reforms, be carried into effect.

Mr. GOWING was opposed to any half-measure of decimalizing. If the plan was adopted with regard to coins, let it be also applied to the weights and measures of the country, so as to decimalize all our accounts.

The CHAIRMAN concluded he might take it as the opinion of the Conference that they were in favour of a decimal system of coins, weights, measures, and accounts.

The following resolution was then unamimously assented to:—"That this Conference earnestly desires an early adoption of the decimalization of weights, measures, coins, and accounts."

AMUSEMENTS FOR THE PEOPLE.

Mr. MARTIN (Guildford) said that, in reference to the question of amusements for the people, the Members of the Guildford Institution were anxious to get up trains for the Members to visit the Crystal Palace, and suggested that Members of the Institutions in Union with the Society of Arts, might meet there on a fixed day.

Mr. WHITWELL (Peterborough) said, that he thought the Society should co-operate with the local Institutions to get, in all towns, a piece of ground for the people to amuse themselves on. In Cambridge there was an open green called Parker's Piece. The people had free access to it, and the consequence, to his own knowledge, was a most beneficial effect on their habits. Now, at Peterborough, he was sorry to say, they had no such place. There should be at least 20 or 30 acres in each town, kept open for the sports of the people. He would make it compulsory on the towns to provide such an area for that purpose. If the Society of Arts would take some steps to have such a provision adopted, it would have the effect of rendering the Society exceedingly popular.

Viscount EBRINGTON thought that they would be dealing with the question of education only by halves, if they did not try and promote such an improvement, which was hardly of less importance than the other measures on which they had deliberated. It was an old proverb, "All work and no play, makes Jack a dull boy." They must keep the people of England physically, as well as intellectually strong: they must take care that the complex nature of man was amply provided for. He would make it compulsory on the municipal authorities of each town to provide such a place of recreation for the inhabitants, but he thought it imprudent for the Society of Arts to actively interfere in the matter. If Mr. Whitwell would propose a resolution upon the desirability of setting aside a piece of ground in each town, he would be most happy to second it.

Mr. BUCKMASTER wished to see such open spaces formed in connection with the Institutions.

Mr. WHITWELL found that where there existed no such open space, children were constantly taken up for trespassing. The want of such an area actually made them criminals, and brought them into trouble.

The Rev. Mr. JONES said that sufficient power was granted to the local Boards of Health to make parks for the sanitary improvements of the people. They should, however, impress on the inhabitants of each town, the importance of cultivating their own physical improvement; and endeavour to establish, in connection with the several institutions, such organizations as cricket-clubs, which he thought had a most advantageous moral influence on the masses. He merely threw that out as a hint to the Conference. He knew that at the last Conference they had reprobated the advertisement duty, and he believed that that had had some weight with the Chancellor of the Exchequer in getting him to abolish it. When they assembled together as the representatives of so many thousand intelligent men who were members of the several Institutions in connection with the Society of Arts, they had a right to speak out boldly on each question. Such things as that they now asked for, were not provided, simply because they were not spoken of strongly elsewhere

The CHAIRMAN stated that he felt strongly the necessity of not allowing the proceedings of the Conference to pass beyond their natural limit, as it was calculated to excite passions which were as well suppressed. He however, would state, that he thought it would be very expedient to procure the allotment of the ground required.

Mr. WHITWELL said that unless they put the question in the way of a popular demand, there was little likelihood of their succeeding. The ground in the neighbourhood of towns letting at from £7 to £8 per acre, and selling at the rate of £400 or £500, was so valuable that it would not be afforded to them unless the ceding of it to the Institutions was made compulsory. When a cemetery was required, they were able to get as much land as they wanted, and even more.

Mr. BUCKMASTER remarked that the bill brought into the House of Commons by Mr. Hutt, only allowed each Institution to procure one acre of ground, which was not, he conceived, space sufficient for cricket. He believed that the decline of the old English popular sports was attended by an increase of crime.

Viscount EBRINGTON proposed, and Mr. WHITWELL seconded, the following resolution:—"That, in the opinion of this Conference, with a view to the bodily, mental, and moral improvement of the community, no less than to its enjoyment, it is essential that due provision be made of adequate spaces for healthful and innocent recreation in the neighbourhood of our towns and villages; and that the members of the several institutions be requested to exert themselves in their several localities, to promote the establishment of healthful and innocent recreations for the inhabitants."

The CHAIRMAN then put the resolution, which was unanimously agreed to.

INDUSTRIAL PATHOLOGY.

The CHAIRMAN said that he had thought that he had gone through all the questions on the paper, but he found that he still had two to dispose of. These were plans for farm-buildings, and the subject of Industrial Pathology. He was afraid that they could not now consider either of them. The latter subject had been brought under the consideration of the Council by Mr. T. Twining, jun., and he wished to explain what was meant by the phrase Industrial Pathology. They intended to convey by the phrase an inquiry into the nature of diseases to which the members of particular trades were especially liable, with a view to their prevention. For instance, as regarded sight, they were aware that at times of general mourning there were more cases of blindness to be met with than ordinarily, from the fact, that the sewing of the black material was injurious to the sight of those employed.

Mr. JACOB BELL said that before the Conference broke up he was anxious to get a deputation from it to attend a meeting which was to be held on Monday next, with a view to restoring the efficiency of the Marylebone Literary Institution.

The CHAIRMAN thought it hardly matter for the Conference.

RATING OF INSTITUTIONS.

Mr. SAVAGE said that he wished to call back the attention of the Conference to the subject of the rating of Institutions. He would suggest that some definite information should be given to them, showing them what to follow and what to avoid, so that they might escape being rated.

Mr. OPPENHEIM reminded the gentlemen present, that at the last Conference, a resolution had been adopted referring the question to a Committee of the Society of Arts. As that Committee had made no report that he knew of, he wished for an explanation of the circumstance.

The CHAIRMAN explained that the Committee had considered the question, but the Society, under present circumstances, did not wish to raise the question. For his

own part, he was of opinion that the principle of particular exemptions was a vicious one.

Mr. OPPENHEIM agreed in that opinion, but thought it would be better if the question were settled one way or the other.

Mr. SOULSBY looked on the institution as the means of educating the lower classes, and thought that they should be at least so far aided by government, as to be delivered from rating. He was sorry to hear the system of special exemptions so strongly censured as vicious.

Rev. J. H. RYLAND called the attention of the Conference to a letter on the subject, written by his brother, and published in the Journal.

Mr. DUFFIELD was quite satisfied that the Society of Arts would not lose sight of the matter.

Mr. WILSON (Leeds) said that many institutions were unwilling that the question should be raised at all, as some now exempt might in consequence be called on to pay.

Mr. NOLDARITT quite acquiesced in the the principle, of allowing the Bill to go through parliament in its present shape. He believed that it was the hope of obtaining the exemption which induced four-fifths of the Societies to enter into Union with the Society of Arts.

The CHAIRMAN said he was anxious to see the system swept away from first to last. He was much interested in the matter, as a member of one and the president of an other institution. If the Conference wished the Counci to move in the House of Commons, they would do it with a view to making the law more equal.

Mr. WHITWELL said what was wished for was that no Institution should be liable for local rates, when there was no proprietary receiving profits.

Mr. OPPENHEIM said that he would move that after the passing of the Bill, this Council do communicate with the House of Commons, with a view to obtain a measure to define what should form the exemption. He belonged to an Institution which was paying £25 a year more than they did the year before. There was the memorable Greenwich case, too. Some Institutions were exempted, whilst others were taxed. The law ought to be defined, for decisions were varied from time to time.

Lord EBRINGTON said that as to asking the House of Commons to give a final decision in a matter that was impossible, for it was well known from experience that the judges of the land often reversed the intentions of the framers of Acts of Parliament.

Mr. HOLE seconded the motion, because he had known such contrary decisions given by magistrates. He would rather that all Institutions should pay rates, and be placed upon an equal footing.

Ultimately the motion was withdrawn, with the permission of the meeting.

The Rev. A. B. POWER (Norwich) said he had now to propose to the Conference a vote of thanks to the Chairman for his able and judicious conduct in the chair. It would be very unbecoming in him to dwell on the important services which that gentleman had rendered to these Institutions. He would, therefore, content himself with proposing a vote of thanks to the Chairman for his kindness in presiding on this occasion.

Mr. GEORGE DAWSON seconded the motion. He had never seen a meeting so well presided over for nearly five hours. He had known many chairmen, but he could honestly say the Chairman on this occasion was the best he had ever seen.

The motion was put, and carried with acclammation.

The CHAIRMAN said he felt much obliged for the kind way in which the meeting had expressed their sense of his poor services. He was deeply interested in the success of Literary and Scientific Institutions and Mechanics' Institutes, and he hoped they would always be productive of great benefits, moral and social. He hoped that he should have the pleasure of meeting all the gentlemen present at the *conversazione* in the evening at St. Martin's Hall.

THE EDUCATIONAL EXHIBITION.

Notwithstanding all difficulties, the Educational Exhibition opened on Tuesday evening, with a success that promises well for its future. The conversazione to inaugurate the Centenary Exhibition, took place at St. Martin's Hall. His Royal Highness the Prince President of the Society, attended by the Marquis of Abercorn, K.G., Viscount Torrington, Major General Wylde, and Colonel Seymour, and suite, was conducted through the rooms by Mr. Harry Chester, the chairman, and other members of the Council, and the officers of the Society, accompanied by the Rev. Muirhead Mitchell, one of Her Majesty's Inspectors of Schools. The following commissioners accredited by their respective Governments to attend this exhibition were present:—For France, M. Milne Edwards, F.R.S., Membre de l'Institut, Doyen de la Faculté des Sciences; for the United States, the Hon. Henry Barnard, Superintendent of State Schools, Connecticut, United States; for Denmark, Mr. Charles Fogh; for Sweden, Dr. Siljestrom, Director of the New Elementary School in Stockholm; for Norway, Dr. Thomas Krag, Theologia Candidatus of the University of Christiana; M. Schmidt, Director of the Tankse Realskole, in Bergen; the Rev. Dr. Carl Heinemann, Rector of the Mercantile Academy, Gothenburg. The general company included his Excellency the Danish Ambassador, the Bishop of Bath and Wells, the Bishop of St. Asaph, Secretary to the Swedish Legation, the Bishop of St. Davids, the Bishop of Oxford, Sir B. Brodie, Bart., Sir H. Holland, Bart., Sir R. Peel, Bart., M.P., Sir J. Ramsden, Bart., M.P., Sir A. Spearman, Bart., Sir P. P. Vyvyan, Bart., M.P., Sir H. Ellis, Sir C. Fellowes, Lieutenant-General Sir C. Pasley, Sir T. Phillips, the Dean of Hereford, the Dean of Salisbury, Archdeacon Lane Freer, Lieutenant-Colonel Everest, Lieutenant-Colonel Sykes, F.R.S., Colonel P. J. Yorke, the Registrar-General, the President of the College of Surgeons, the President of the College of Physicians, the Lord Mayor, the Lord Mayor of York, Mr. Sheriff Wire, Mr. Headlam, M.P., Mr. Hindley, M.P., Mr. W. Hume, M.P., Mr. Lockhart, M.P., Dr. Michell, M.P., Mr. D. Morris, M.P., the Hon. and Rev. S. Best, the Rev. Dr. Jacob, the Rev. A. Bath Power, the Rev. B. Powell, F.R.S., the Rev. Canon Moseley, F.R.S., the Rev. Dr. Major, the Rev. Dr. Hessey, the Rev. W. H. Brookfield, the Rev. Derwent Coleridge, the Rev. J. Barlow, F.R.S., the Rev. Dr. Adler (Chief Rabbi), Dr. Roget, F.R.S., Dr. Southwood Smith, F.R.S., Dr. Lee. Dr. Kirkpatrick, Dr. Guy, Dr. Bence Jones, F.R.S., Dr. Farr, Dr. T. K. Chambers, Dr. W. B. Carpenter, F.R.S., Dr. Bright, Dr. Neil Arnott, F.R.S., Dr. Julius Bahnsen, Mr. C. Wentworth Dilke, Rev. Dr. Booth, F.R.S., Mr. H. Cole, C.B., Mr. J. Simon, F.R.S., Mr. W. R. Grove, F.R.S., Mr. Maurice Cross, Mr. Warren De La Rue, F.R.S., Mr. E. Baines, Mr. T. Winkworth, Mr. Eaton Hodgkinson, F.R.S., Professor Donaldson, Mr. C. Babbage, Mr. W. Bird, Mr. Peter Graham, Mr. J. C. Macdonald, &c.

St. Martin's Hall, Long Acre, is a large building, and the rooms appropriated to the Exhibition are the Great Hall, the Library, two Class Rooms, the Entrance Hall Staircase, and Passages. Besides these, there is also a long wide room over the large hall.

The Committee of Management, when they came to measure the space, almost despaired of fully occupying it with educational materials; but when their invitations had been replied to, it was found that application had been made for more space than the building contains. The original intention had been to divide the articles sent in amidst a series of courts, according to subjects, which would have been perhaps the most interesting and instructive method of management; but so many difficulties occurred that the present plan was devised and adopted. Applications had been made from Foreign States, and from the Chief Educational Societies of our own country. It was thought that by uniting all these in the large hall, the Exhibition would possess great public interest for all parties. Thus the

great Educational Societies of all denominations—the Privy Council, and the Department of Science and Art, have exhibited in connection, and in friendly emulation with the colonies of Great Britain and the Continental States. H.R.H. Prince Albert has been graciously pleased to order for exhibition some specimens used in the studies of H.R.H. the Prince of Wales, which are also placed in the Great Hall. In it also has been added the books in use in our chief public schools. It may with truth be stated, that this Educational Exhibition exhibits a fair and very large sample of the educational materials and statistics of the whole civilised world. The thanks of the Society are due to Mr. Brucciani for the casts from the antique, which he has lent to decorate the Hall.

The Galleries of the Hall have been assigned to the exhibitors of Philosophical Apparatus; the entrance hall to School Apparatus; the staircase and lecture room to Maps (chiefly foreign) and Plans. The smaller rooms on the ground floor contain Results from English schools. In these rooms the visitor will find much of interest. Here dolls, models, and fancy work are exhibited, with strong boots and shoes, boy's jackets and trousers, and rough mats, and printing apparatus, showing an education that combines the useful with the ornamental. It was with regret the committee found they had no alternative but to appropriate the upper room above the hall to the uses of the booksellers who wished to exhibit. They thought, however, that their department would be so interesting to the public generally, that the inconvenience of the approach would not materially interfere with the numbers that visited it; and, accordingly, the chief gentlemen of the trade have been content to make there a display which no person really interested in the purposes of the exhibition willf neglect to carefully inspect. H.R.H. Prince Albert, at the opening, paid the greatest attention to this department, and was pleased to observe particularly the most remarkable articles in each court.

Press of other matter renders it impossible to enter into further details this week. The Society have only to thank all parties concerned in the arrangement of the Exhibition, and to express their gratitude to the exhibitors for the cheerful, cordial manner in which these arrangements have been for the most part received, and they still hope that further accommodation may be provided. Mention must not be omitted of the boy bands from the Chelsea Asylum and the Caledonian School, who deserve every credit for the manner in which their music was performed on the opening night.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £946, including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

EIGHTH LIST.	£	s.	d.
Dr. Baly	1	1	0
John Becke	1	1	0
F. Bennoch	3	3	0
W. Chambers	1	1	0
T. Colby	0	10	0
H. D. P. Cunningham	0	10	6
Derby, Railway Literary Institution	1	1	0
Arthur Hill	2	2	0
W. Longmaid	0	10	0
Messrs. Myers and Solomon	3	3	0
Morris S. Oppenheim	0	10	0
T. A. Preller	2	2	0
Sir John W. Ramsden, Bart. M.P.	20	0	0
Alderman J. Saddington	1	1	0
Dr. Stone	1	1	0
J. Whatman, M.P.	5	0	0
C. J. Womersley	1	0	0
John Yeats	1	1	0

INSTITUTE BOOK ORDERS.

JUNE ACCOUNT.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Ashbourn, Literary Institute	1	10	0	0	18	10
Derby, Railway Literary Institution	9	5	0	5	1	2
East Retford, Literary and Scientific Institution	0	17	3	0	14	3
Gateshead, Mechanics' Institute	3	6	11	2	11	3
Hitchin, Mechanics' Institution	3	6	6	2	6	5
Horncastle, Mechanics' Institution	2	16	6	1	18	1
Huddersfield, Mechanics' Institution	5	0	0	3	8	8
London, Bank of England Library & Literary Association	10	4	0	7	16	6
Pembroke Dock, Mechanics' Institute	4	4	0	2	12	7
Preston, Literary and Philosophical Institution	7	15	0	5	16	11
Sevenoaks, Literary Institution	3	0	8	2	7	6
Stamford Institution	2	4	0	1	15	2
Tottenham, Literary and Scientific Institution	0	14	6	0	11	6
	£54	4	4	£37	18	5

Being a saving of £16 5s. 11d., or an average discount of about 30 per cent.

GENERAL MEETING.

Wednesday, July 5th, 1854.

The General Meeting for the election of officers for the ensuing year, was held on Wednesday, the 5th inst.—Mr. Harry Chester, Chairman of Council, in the chair—when the following noblemen and gentlemen were declared to be duly elected to fill the several offices. The names in *Italics* were not in last year's list.

COUNCIL.

PRESIDENT.

H.R.H. PRINCE ALBERT, F.R.S., &c., &c.

VICE PRESIDENTS.

Lord Ashburton, F.R.S.
Harry Chester.
Henry Cole, C.B.
C. Wentworth Dilke
William Ewart, M.P.
The Earl Granville, F.R.S.
Lord Robert Grosvenor, M.P.
The Earl of Harrowby F.R.S.
The Dean of Hereford.
Henry Thomas Hope.
Joseph Hume, M.P., F.R.S.
William Hutt, M.P.
George Moffatt, M.P.
The Duke of Newcastle
Lieut.-Gen. Sir C. Pasley, K.C.B., F.R.S.
Samuel Morton Peto, M.P.
Dr. Lyon Playfair, C.B. F.R.S.
John Scott Russell, F.R.S.
William Tooke, F.R.S.
The Lord Bishop of Winchester.

OTHER MEMBERS OF COUNCIL.

Lord Berriedale	*Sir John Ramsden, Bart., M.P.*
William Bird	Samuel Redgrave, *Treasurer.*
Rev. Dr. Booth, F.R.S.	*W. Wilson Saunders, F.R.S. Treasurer.*
Thomas De la Rue	Thomas Twining, Jun.
Lieut.-Col. F. Eardley-Wilmot. R.A.	*G. F. Wilson*
Viscount Ebrington	*Thomas Winkworth*
Peter Graham	
J. C. Macdonald	

AUDITORS.

W. F. Harrison | *Matthew Marshall*

SECRETARY.

Peter Le Neve Foster.

COLLECTOR AND FINANCIAL OFFICER.

Samuel Thomas Davenport.

The following Candidates were balloted for, and were declared to be duly elected Ordinary Members:—

Acland, Thomas Dyke	Lawrie, James
Bastard, Thomas Horlock	Leeman, George
Bell, Jacob, F.L.S.	Nash, Eliezer
Booth, Charles Edward	Nightingale, W.
Brett, Rev. William	Payne, George Josiah
Browne, Rev. J. C., D.C.L.	Phillipis, Sir Thos., F.G.S.
Browne, T. Beale	Pitts, Samuel
Burton, William S.	Rigg, Richard
Butler, Paul	Russell, Lady Frankland
Clench, Edmund	Salisbury, The Dean of
Cochrane, John	Sclater, George
Cole, Thomas	Slee, Charles W.
Cox, Dr. Thomas	Stephens, Francis
Dawson, Geo. M.A., F.G.S.	Street, William Fauntleroy
Ellis, Joseph	Thimbleby, John
Fladgate, William Mark	Walker, Major Jas. Scott
Gadesden, George Arthur	Wilson, Alderman Samuel
Gowen, James Robert, F.R.G.S., F.G.S.	Winchester, The Bishop of
Gurney, Samuel, jun.	Woodrooffe, Rev. Thomas, Canon of Winchester
King, Alfred, C.E.	Woollcombe, Thomas
Kingsley, Rev. William Towler, B.D.	Yeats, John

INDIAN FIBRES.

The following letter has been addressed to the Right Honourable Sir Charles Wood, Bart. M.P., President of the Board of Control for the Affairs of India, by Samuel Gregson, Esq., M.P.:

Dear Sir Charles,—Among the many important questions now pressing upon public attention, there are two which I venture to bring particularly under your notice, both for the interest of India and of the public at large. They are—the means of providing an effective and ample substitute for flax and hemp for our manufactures, and of obtaining the necessary quantity of material, now notoriously inadequate, to supply the demand for the production of paper.

The war with Russia affects in a material degree our command of those important articles, flax and hemp; while the rapidly and largely increased consumption of paper without any corresponding extension, but rather a diminution, of the supply of the raw material for its production, operates prejudicially on what may now be called a necessary of life.

Allow me to submit to you a few facts bearing upon each of these matters.

The growth of flax has rapidly increased within the last few years in the United Kingdom, and especially in Ireland. In 1849 the quantity of land in Ireland under this crop was 60,314 acres; and taking its average yield at 6 cwt. per acre, the produce would be 18,094 tons. In 1853 there were 174,423 acres under flax cultivation, yielding, at the same average, 52,327 tons.

The importation of foreign flax for the last three years has been

	From Russia. Tons.	All other parts. Tons.	Total importation. Tons.
In 1851...	40,934	18,775	59,709
1852...	47,426	22,703	70,129
1853...	64,399	29,770	94,169
Total in 3 years ...	152,759	71,248	224,007
Average per Annum	50,920	23,749	74,669

showing that the importation last year from Russia was 16,973 tons more than that of the year preceding—13,479 tons above the average of the three years—and within 10,270 tons of the total average importation from all parts of the world.

Putting out of view the growth of flax in Great Britain, of which we have no available information, the importation, and the Irish production together, of flax during the last year amounted to 146,496 tons, of which entire quantity nearly one-half, and of the total importation more than two-thirds, came from Russia, its market value (at *peace* prices averaging £30 per ton) amounting to nearly £2,000,000.

Then, for hemp. Of the articles passing under this general title, including Sunn and Jute, from India, and that known as Manilla hemp, the quantities received from Russia do not bear the same proportion as in the case of flax: being

	From Russia. Tons.	All other parts. Tons.	Total Importation. Tons.
In 1851...	33,229	31,442	64,671
1852...	27,198	26,516	53,714
1853...	41,819	21,323	63,142
Total in 3 years...	102,246	79,281	181,527
Average per annum	34,082	26,427	60,509

Here again, however, we see that Russia has supplied considerably more than half the entire importation, realizing last year upon 42,000 tons, at *peace* prices, averaging £35 per ton, a market value of nearly £1,500,000.

It appears then that last year we received from Russia of these two articles

Flax	64,399	tons—at a cost of	£1,931,970
Hemp... ...	41,819	,, ,,	1,463,665
Total	106,218	,, value	£3,395,635

and the present war price has enhanced that value to upwards of £6,500,000.

Next, as regards paper. We are, comparatively, little dependent upon other countries for the direct supply of material in the state in which it is used in the manufacture of this most important article. Without particularly specifying the quantities of rags imported, chiefly from Germany and Italy, it may be taken at less than a twelfth part of the entire weight of material of all kinds used for paper-making. But, small as that importation is, in proportion to our wants, we are not suffered to retain it. The Americans are large buyers of rags in this country; whether of those imported or of our own production is immaterial; the general consumption in the United States, so enormous is the quantity used for newspapers, exceeding their own internal supply.

With this state of things is to be coupled the vast increase in the consumption of paper in this country. In the five years, 1830 to 1834, prior to the reduction of the Excise duty on first class papers from 3d. to its present equalized rate of 1½d. per lb., the average annual quantity made was 70, 988,131 lbs.; and in the last five years, 1849 to 1853, the average annual quantity made was 151,234,175 lbs. The production of the year 1853 was 177,623,009 lbs. being above 23,000,000 lbs. (more than 10,000 tons) over that of the preceding year, and more than 36,000 tons over 1834: such excess requiring for its production not less than 13,000 tons of raw material in the former case, and nearly 47,000 in the

latter. The whole weight of material employed in the manufacture of paper only may be stated at between 110,000 and 120,000 tons per annum. And a curious proof of the urgency with which additional sources of supply are needed, is furnished by an advertisement in the *Times* of this day, which I append to this letter.

It results then from these several statements, that for our textile manufactures, rope and twine, and paper makers, we are short of the requisite supplies of raw material, as compared with our position at the beginning of last year, to the extent of nearly 120,000 tons, viz.—

Last year's import from Russia of hemp and flax, as above	106,218	tons.
The above excess for the make of paper	13,000	,,
Deficiency	119,218	,,

subject only to such diminution of that quantity as Russia may find means to convey to us by circuitous routes. With a liberal allowance for this possible diminution, we may fairly consider ourselves deficient to the extent of a quantity ranging between 80,000 and 100,000 tons of fibrous matter.

This being our position, it is a subject of much interest to determine in what way so large an actual or impending deficiency can be supplied.

To this point I proceed now to draw your attention; and if the facts which have come before me are substantially correct, of which there seems to be no reasonable doubt, it would appear that not only can we obtain adequate supplies from India, but that something like reproach attaches to us for having permitted ourselves so long to neglect to procure, to some extent at least, these essential commodities from that great country.

Dr. Forbes Royle—whose reputation as an experienced Indian botanist is too well established to stand in need of any individual testimony, and whose valuable Paper on this subject, recently read before the Society of Arts,* I will, as it is already out of print, circulate with this letter throughout India—has distinctly proved the existence in various parts of our Indian Empire, not only of the identical plants which furnish Flax and Hemp, but of numerous other plants yielding fibres of great importance; some of them greatly superior in strength and general value to either of those articles.

The proof of this is too important to be omitted here. Having submitted a variety of fibres to be tested, the weight each broke with he ascertained to be as follows:

Fibres in equal weights and of equal lengths tested at the East India Company's Military Stores.

	lbs.
Petersburgh, broke with	160
Jubhulpore hemp, from Mr. Williams	190
Wuckoo nar fibre, Travancore	175
Mudar or Yercum fibre, common all over India.	190
China grass, Boehmeria nivea	250
Rheea fibre, the same from Assam	320
Wild Rheea, Boehmeriæ species from Assam	343
Kote Kangra hemp (no breakage at)	400

East India House, Dec. 16th, 1853.

It is true that some of these Indian plants are grown in places remote from the sea-board, and from which there are still very bad roads, or no roads at all, for transport; but several of them, and amongst them perhaps the most prolific of all, are of very extensive growth in parts contiguous to the coast, and therefore capable of being beneficially and cheaply prepared for exportation.

The most conspicuous of these is the *Plantain*, which yields a valuable fibre, and is everywhere cultivated in the plains of India for its fruit, an article of universal consumption by the native population. It is a tree which bears fruit only once, and as soon as that is removed it is, and has been from time immemorial, cut down and left to rot upon the ground. Persons who have paid close attention to the subject, state that there will be no difficulty in obtaining from this plant alone any required quantity of fibre of admitted valuable quality, and as fast as the mechanical appliances necessary for its preparation can be sent out.

Upon this essential point I have reason to believe that machinery is devised and patents are secured for the processes of preparation, calculated to carry on every necessary operation both as regards fibre for textile purposes and pulp for paper, in a perfect manner; and at a cost which, even under any conceivable rise in the price of the raw material in India, must command such a profit as to ensure its continuous and almost unlimited production.

Some statements have also been prepared, and are readily producible, showing a very tempting pecuniary profit to induce parties in India to provide the material required, and that the simple and efficient machinery to be employed may be furnished at a moderate cost.

Applicable as this fibre is to the manufacture of every species of cloth or other article usually made from Flax or Hemp, and of equal quality, it can be used with no less facility and advantage in the manufacture of Paper; thus supplying both the one and the other of the important desiderata which the foregoing facts and figures establish.

We have, therefore, within the limits of our own possessions, in the East Indies and in the West, ample means of furnishing at a low price as much of this important product as our utmost wants can require.

Permit me, in conclusion, to add, that this question, involving as it does the interests of India, which, in your high position as President of the India Board I know you watch over with anxious solicitude, embraces also the interests of the whole Empire, especially at this moment; and I feel assured of its receiving, as it well deserves, your prompt and earnest attention, and the continued favourable consideration of the East India Company, and of Her Majesty's Government.

I am, dear Sir Charles, yours very faithfully,

SAMUEL GREGSON.

London, June 1, 1854.

MEETINGS FOR THE ENSUING WEEK.

TUES. Zoological, 9.
WED. Literary Fund, 3.
Royal Botanic, 3½.—Promenade.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, June 30th*, 1854.]

Dated 12th January, 1854.

77. J. Serf, Paris—Seats or chairs for advertising.

Dated 10th April, 1854.

835. L. M. Trouble, Paris—Stamping apparatus.

Dated 15th April, 1854.

874. C. B. Goodrick, Old Kent road—Artizan's tool.

Dated 10th May, 1854.

1041. J. W. Hoby, Renfrew, and J. Milner, Stanley street, Pimlico—Steam engines.

Dated 11th May, 1854.

1049. H. Taylor, Queen street, Cheapside—Chair bedsteads.

Dated 30th May, 1854.

1194. A. E. L. Bellford, 16, Castle street, Holborn—Paper bags. (A communication.)

Dated 2nd June, 1854.

1227. E. Websky, Wustewaltersdorf—Blacking. (Partly a communication.)

Dated 14th June, 1854.

1294. J. Barlow, Accrington—Extracting Gluten, and preparing for sising.
1295. J. Pickup, Liverpool—Steering apparatus.
1296. J. Hargrave, Kirkstall—Washing, scouring, and felting.

Dated 15th June, 1854.

1297. J. Edwards, Camberwell—Knife cleaner.
1298. F. Martini, Elberfeld—Steam engines.
1299. T. Wilson and J. Hadley, Birmingham—Rolls and dies.
1300. J. Kite, Princes street, Lambeth—Expressing moisture from substances.
1301. J. Gedge, 4, Wellington street South, Strand—Locks and latches, spindles and knobs.
1302. S. Varley, Stamford—Haymaking machine.
1303. J. D. M. Stirling, Blackgrange, N.B.—Iron. (Partly a communication.)

* Vide Journal of the Society of Arts, No. 73, p. 360.

Dated 16th June, 1854.

1304. J. E. Piper, New road—Factitious leather.
1305. W. Brindley, Moorgate street—Steam for offensive and defensive purposes.
1306. R. Hornsby, Grantham—Portable thrashing machines.
1307. T. M. Fell, 74, King William street, City, and W. Cooke, Curzon street, Mayfair—Ventilators.
1308. W. Cooke, Curzon street, Mayfair—Boots and shoes.
1309. C. Hargrave, Birmingham—Iron.
1310. W. Evans, St. Leonard's terrace, Chelsea—Tap.
1311. F. Martini, Elberfeld—Steam engines.
1312. J. Macnee, jun., Glasgow—Caps and hats.
1313. F. J. Julyan, 20, Gerrard street, Soho—Musical sounds.
1314. W. G. Pidduck, Camberwell—Vent pegs.
1315. H. Hughes, Aldersgate street—Cutting and embossing.
1316. T. Parramore, 50, Castle street, Southwark—Air-tight seats, beds, &c.
1317. D. Lowe, Leicester—Knitting machinery.

Dated 17th June, 1854.

1318. G. J. Hinde, Wolverhampton—New material for drain pipes.
1319. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Bitumen. (A communication.)
1320. J. Aspinall, Tavistock square—Vacuum for evaporative purposes.
1321. J. Fourdrinier, 12, Sherborne street, Islington—Cleaning and bleaching rags.
1322. A. V. Newton, 66, Chancery lane—Block-printing. (A communication.)
1323. J. Rawe, jun., Haverstock hill—Stoves.
1324. G. Holloway, Stroud—Sewing and embroidering machines.
1325. J. A. Williams, Baydon, Wilts—Ploughing.
1326. A. E. L. Bellford, 16, Castle street, Holborn—Water-mill machinery. (A communication.)

Dated 19th June, 1854.

1327. L. A. Henry, Metz—Railways.
1329. Sir. J. C. Anderson, Fermoy—Railways.
1330. G. Mears, Whitechapel road—Obtaining sounds.
1331. J. Westlake, Newton Abbott—Treating 'tailings.'
1333. W. Bauer, Munich—Propelling vessels.
1334. P. G. Dartiguenave, Regent street—Aerial navigation.
1335. J. W. Schlesinger, London wall—Discovering places on maps. (A communication.)
1336. S. Riley, Oldham—Pocket books.
1337. J. Oliver, Wapping—Signal lantern.
1338. D. Bogue, Fleet street—Attachment of adhesive stamps. (A communication.

Dated 20th June, 1854.

1339. H. Worrall, Staley bridge—Carding.
1340. W. Brunton, Camborne—Metallic pistons.
1341. J. Acland, Langley cottage, South Lambeth—Paper.
1342. T. L. Holt, 4, Warwick square, and W. C. Forster, 84, Hatton garden—Paper.
1343. C. Reeves, Birmingham, and W. Wells, Sutton Coldfield—Metallic tubes.
1344. J. Day, Birmingham—Candlesticks.
1345. A. Stephen and A. Pirnie, Kelvinhaugh, near Glasgow—Templates for rivet and bolt holes.
1346. J. E. Jesson, Paris—Hydrographic barometer.
1347. N. Clayton and J. Shuttleworth, Lincoln—Thrashing and winnowing machines.
1348. W. T. Monzani, St. James's terrace, Bermondsey—Brushes and brooms.
1350. F. Braithwaite, Gower street—Suspension bridges and roofs.
1351. G. R. Chittenden, Wood street—Sewing machines. (A communication.)
1352. A. M'Laine, jun., Belfast—Gun boats.
1353. W. E. Newton, 66, Chancery lane—Pigments. (A communication.)
1354. G. H. Byerley, Paris—Bricks, tiles, tubes, &c.

Dated 21st June, 1854.

1356. J. M'Innis, Liverpool—Coating for iron ships.
1360. J. W. Shaw, Birmingham—Motive power. (A communication.)
1362. T. Rhoads, Vine street, America square—School slates. (A communication.)
1364. W. Parsons, Paradise-street, Lambeth—Rotatory engines.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1414. S. S. Shipley, Stoke Newington—Fittings for dressing cases, &c.—June, 27th, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed, June 30th, 1854.

3023. William Pickstone, of Radcliffe, and John Booth, of Pilkington—Improvements in looms for weaving.
3031. Henry Vernon Physick, of 38, North Bank, Regent's Park—Improvements in electric telegraphs and apparatus connected therewith.
3034. Weston Tuxford, of Boston—Improvements in portable thrashing machines, part of which improvements is also applicable to fixed thrashing machines.
3038. James Slater, of Salford—Improvements in cocks, taps, or valves.
11. James Stovold, of Barnes—Improvements in machinery, or apparatus for sifting and washing gravel or other similar substances.
16. Thomas Mann, of Horsham—Improved cinder shifting shovel.
19 David Hulett, of High Holborn—Improvements in gas regulators for regulating the supply of gas to the burner.
23 David Blair White, M.D., of Newcastle-upon-Tyne—Improvements in the manufacture of waterproof fabrics, and of waterproof bags and other like articles.
27 John Mason, and Leonard Kaberry, both of Rochdale—Improvements in machinery or apparatus for preparing cotton, wool, and other fibrous materials for spinning.
30. Henry Hind Edwards, of Ludgate Hill—Improvements in treating peat and vegetable matters for the purpose of fuel, as well as in the extraction of other useful products therefrom—(Partly a communication).
66. William Watt, of Glasgow—Improvements in the application of heat to drying purposes.
72. Felix Tussaud, Engineer, of Paris—Universal pump-press with continuous action, called continuous producer.
213. Wellington Williams, of Cheapside—Method of and apparatus for heating the heaters of box irons and other like purposes.
582. Alfred Vincent Newton, of 66, Chancery Lane—Improvements in the mode of purifying coal gas, and of obtaining during the manufacture of the gas a certain purifying material, and in apparatus to be used in purifying gas.
616. Peter Armand le Comte de Fontaine Moreau, of 4, South street Finsbury—Improvements in heating apparatus.
781. William Edward Newton, of 66, Chancery lane—Improved apparatus for printing piece goods or fabrics.
799. Alfred Vincent Newton, of 66, Chancery lane—Improvements in the construction of hot-air engines.
822. William Edward Newton, of 66, Chancery lane—Improvements in producing stereoscopic pictures, and in the apparatus for exhibiting such or similar pictures.
825. Alfred Vincent Newton, of 66, Chancery lane—Improvements applicable to the manufacture of weaver's harness.
838. Alfred Sohier Bolton, and Francis Seddon Bolton, both of Birmingham—Improvement or improvements in the construction of steam boilers.
937. William Edward Newton, of 66, Chancery lane—Improved machinery for casting type.

Sealed June 30th, 1854.

6. To Edward John Carpenter, Capt., R.N. of Toft Monks, Norfolk—Improvements in the application of machinery for assisting vessels in performing certain evolutions upon the water, especially tacking, veering, propelling, steering, casting, or winding, and backing astern, extension for 6 years from 13th June, 1840—Dated 14th June, 1854.

Sealed July 4th, 1854.

53. William Brown, of Bradford—Improvements in preparing to be spun wool and other fibrous material.
69. Ralph Lister, of Scotswood, Northumberland—Improvements in distilling apparatus.
277. George Mills, of Glasgow—Improvements in the construction of steam vessels and in steering the same.
289. James Balie Graham, of Glasgow—Improvements in the production of printing surfaces.
827. John Platt, of Oldham—Improvements in machinery for preparing cotton.
939. William Edward Newton, 66, Chancery lane—The application of a new or improved material or substance to the construction of certain parts of machinery.
943. Richard Ford Sturges, of Birmingham—Improvement or improvements in joining metals.
993. William Westley Richards, of Birmingham—Improvement or improvements in loading certain kinds of fire-arms.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
June 29.	3605	Teapot	William Andrews	Dublin.
„	3603	Pencil-knife, with "Reserve" for Leads	John Nowill and Sons	Meadow street, Sheffield.
„ 30.	3607	Double-action Sliding Nozzle Lock	Philip and Fredk. Schafer	12, Brewer street, Golden square.
„	3608	A Camera, by which Portability and Compactness are obtained	Bland and Long	153, Fleet street.
July 1.	3609	Part of a Lawn Rake	Sir Thos. F. J. Boughey, Bart.	Aqualate Hall, Staffordshire.
„ 5.	3610	A Lanthorn, to be called "Price's Government Emigrant Ship Lanthorn"	Price's Patent Candle Company	Belmont, Vauxhall.

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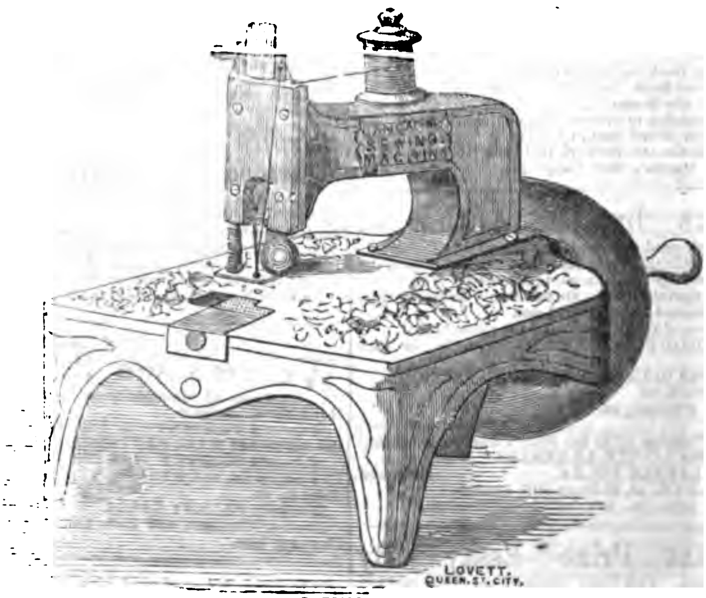

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Journal of the Society of Arts.

FRIDAY, JULY 14, 1854.

Educational Exhibition.

Their Royal Highnesses the Prince of Wales and Prince Alfred, attended by the Very Rev. the Dean of Windsor, and Mr. Gibbs, visited the Educational Exhibition yesterday morning. The different objects in the Exhibition were pointed out to their Royal Highnesses by Mr. Harry Chester, the Rev. M. Mitchell, the Foreign Commissioners, and the Secretary.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £1000, including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

NINTH LIST.

	£	s.	d.
Rev. J. Barlow, F.R.S.	2	0	0
Dr. Biggs	1	0	0
J. Bonham Carter, M.P.	5	0	0
Miss A. B. Coutts	25	0	0
The Worshipful Company of Drapers.	21	0	0
W. Earle	3	3	0
Lieut. R. W. H. Hardy, R.N.	1	0	0
W. Harrison	1	1	0
Rev. T. James	1	0	0
Count de Montizon	10	10	0
J. Ruddock	2	2	0
E. C. Tufnell	1	1	0
Rev. F. Watkins	2	2	0
J. B. Whitehead	1	1	0

ABSTRACTS OF LECTURES, PAPERS AND DISCUSSIONS.

[Th]e Rev. W. Whewell, D.D., Master of Trinity College, Cambridge, "On the Material Helps of Education."

[T]he lecturer said that as he had not yet had the oppor[tun]ity of examining the collection of the means and [hel]ps to education which the scheme of the Educational [Ex]hibition had brought together, he must regard the [sub]ject in its general aspect, as it offers itself to our [tho]ughts. We suppose education to be understood, not in [a] new or peculiar signification, but in the ordinary and [fam]iliar sense in which it is commonly spoken of among [inte]lligent persons. We consider *general* education as [oppo]sed to special, technical, or *professional* education; [and] we speak especially of intentional or *formal* education, [as d]istinguished from the *spontaneous* education which [prec]edes such formal education, and takes the place of it [in so]me cases; and as distinguished, on the other hand, from the *ripening post education* which follows formal education.

Education, in this sense, may be defined as the process by which the individual is made a participator in the best attainments of the human mind in general, namely, with what is *rational*, *true*, *beautiful*, and *good*.

The individual participates in the *rational* attainments of man by becoming acquainted with language, which is the instrument of reason. Education begins with our own language; and none of the means of education is so universal, necessary, powerful, and extensive, as this most cheap and common one. A special point to attend to in using language for the purposes of education, is to teach the history of the language—the way in which words came to mean what they do mean. This inquiry, in the case of modern languages, contains elements additional to what it had in the case of Greek, in consequence of the influence of the subsequent history of nations and of thought upon languages. In English there are additional peculiarities in the history of the language, in consequence of its containing two main component parts—the Saxon part and the Latin (and Greek) part. The result of this history is that, at present, *the only living part of the English language is the dead languages.* The material means of education, in regard to language, are school-books—as grammars and vocabularies. And it is a great improvement, recently introduced into English education in this branch, that school-books have been published in which these two elements of the language—the Teutonic and the Latin part—are distinguished and separated.

The individual participates in the knowledge which man has attained of what is *true* by becoming acquainted with collections of truths, such as geometry, arithmetic, mechanics, and astronomy. Arithmetic and geometry ought to be taught by being reduced to *intuition*. In the case of geometry there are some difficulties in this reduction, which may be illustrated, and, in fact, removed, by folding a leaf of paper. In this way we may define a straight line and a right angle, and prove that the three angles of a triangle are equal to two right angles. We may also construct a pentagon, which may be shown (though not without some geometrical skill) to be equilateral and equiangular. Also, in mechanics, the relation of the weights on inclined planes may be reduced to intuition, by an ingenious illustration, devised by Stevinus, of Bruges. In astronomy, the helps of education are ancillary spheres, orreries, and the like.

It is a part of education to make the individual a participator in what is *beautiful*, even of common education, for we wish our pupils to admire what is beautiful in the thoughts, expressions, or melody of what they read, and talk of the beauties of Milton and of Shakespeare. Again, musical melody has its beauty, as well as the melody of verse; and it is a great improvement in modern education that music has been made a more prominent part of it. Also an acquaintance with what is beautiful in the combinations of forms and of colours, has a beneficial influence upon young persons in the way of general education, besides being important in many kinds of technical education. The collections of the Educational Exhibition will doubtless illustrate this branch.

To make man a participator in what is *good* is to teach him morality and religion; and the best mode of doing this is a matter of controversy on which we do not enter. Nevertheless all parts of human culture are enriched, and to teach men what is true and beautiful helps the teaching of what is right and good.

Professor De Morgan, "On the Relation of Mathematics and Logic to other Branches of Science."

The lecturer commenced by stating that he should chiefly treat of the connection between mathematics and logic, without entering upon other uses of mathematics in training the mind, as, for instance, the aid it gives in forming the power of concentration of the whole mind on

one subject. Mathematics and logic are not dependent on any previously-acquired knowledge; and between the ages of six and twelve should be laid the foundation of mathematical and logical modes of thought. In former times it was imagined that the mind could gather knowledge from itself; all that was necessary was to till the ground, and the sowing of the seed was neglected. The present age runs into a contrary extreme. The lecturer then urged the necessity of not overloading the minds of boys, and gave it as his opinion that there was too much of it in our schools.

After pointing out that the history of mathematical learning in England showed a wider diffusion of such knowledge, though not the same amount of concentration, in academies and institutes, Mr. De Morgan proceeded to point out that the principal difficulty of a mathematical instructor, in teaching his science as a discipline, is the absence of logical mode of thought in his pupils. He denied that mathematics could (except in instances) supply the defect, without conjunction with something much more akin to direct logical instruction than is usually given. Of the illustrations used, it is impossible to give a short abstract.

Rev. J. S. Howson, M.A., Principal of the Collegiate Institution, Liverpool, "On Teaching Geography."

he author began by pointing out the importance of geography, from its close connection with all other sciences, and from its coming in contact with every human interest. For these reasons he regarded it as a natural basis of reference in the teachers' hands for all the subjects in which his pupils were instructed. He described the dull mode of teaching geography as a mere lesson of memory twenty years ago, and remarked that the recent change in this respect was a cause of great congratulation, and a ground of much hope for the future. Still, he said, there was some danger of rushing into the opposite extreme, by adopting exclusively oral instruction, and of forgetting that the memory must be used in learning geography effectually. Under these circumstances, it was instructive to observe that the Germans were drifting towards our method of placing school-manuals in the hands of the pupils, as we were moving towards their method of oral instruction. In communicating the earliest notions of geography to the young, it was best to begin by conversation, and by eliciting the observation of the children; then to proceed to instruction by maps without any books. In these early stages it was best to proceed from the known to the unknown, from the concrete to the abstract, beginning with plans of the school-room and playground, and then passing to the observation of the physical features of the neighbourhood, and so on, till notions of the earth as a whole were gradually acquired. At a later period it would be desirable to combine the inverse method with the former, starting from the abstract geographical ideas and filling in the details. Above all things it was desirable that the physical features should be clearly presented to the pupils, as distinct from the political divisions of countries, and yet as being closely connected with them. Great stress was laid on the drawing of maps, with the proviso that geography could no more be learnt by the mere act of copying maps, than botany by drawing flowers. A suggestion made by Mr. Howson in a previous communication to the Journal, was repeated, to the effect that the Society might do much service by promoting the publication of a good commercial geography. Several remarks were made on the geographical manuals and wall-maps in the Exhibition; and the lecturer concluded with a protest against the notion that the mere furnishing of a school with apparatus would necessarily make it efficient.

This being a conversational meeting, at the close of the paper, Mr. H. Chester, the chairman, invited a discussion.

The Dean of Hereford pointed out the necessity for having some reference to a scale, and explained a ready means of teaching by drawing a map with chalk on the floor. The bearings of the cardinal points should be taught, but not by sun-set and sun-rise, which was fallacious.

The Rev. M. Mitchell pointed out to the meeting the maps which were principally worthy of notice in the Exhibition.

The Rev. A. Bath Power called attention to the means of producing cheap and good maps, by block-printing, in a manner similiar to that by which paper-hangings are produced, and stated all that was wanted was a certain and large demand, to enable the manufacturer to supply them at a cheap rate. He alluded also to the botanical illustrations thus produced. He agreed with the Dean of Hereford, as to the necessity of a scale, so as to teach the comparative extent of countries.

The Rev. A. P. Stanley (Canon of Canterbury) spoke as to the desirableness of introducing other matters into the teaching of geography, which would give interest to the pupils, such as, for instance, this statement, that all words having the termination "by" as Whitby, showed a Danish origin.

Mr. E. C. Tufnell said, that there was still a controversy among the Germans, as to the best mode of commencing the teaching geography, whether from generals to particulars or *vice versa*. He believed the right principle was to begin with the particular, such as the child's own immediate neighbourhood, and thus proceed from the known to the unknown.

Mr. Camps urged the importance of combining ethnology and geography.

Mr. Bland described a ready and cheap means for making model maps with sand and coloured powders.

Dr. Krag (of Norway) agreed with the principles laid down in Mr. Howson's paper, and stated that such principles were practised in the schools of his country.

Mr. Hugo Reid spoke of the general importance of the subject.

NEW YORK INDUSTRIAL EXHIBITION.

Sir Charles Lyell's Report on the Geological Department.*

The classification of objects in the class of "Mining and Mineral Products," in the New York Crystal Palace, was essentially the same as that adopted in the London Exhibition of 1851. The prospectus of this Exhibition stated, that it was intended "so to arrange the objects belonging to this class in a separate space assigned to them, as to make them afford information similar to that derived from mineralogical and geological maps, with the additional advantage of having presented to the eye the specimens themselves derived from each mining and mineral region. These collections were also to be accompanied and illustrated by geological maps and sections and by mining plans. Such intention has been to a considerable extent carried into execution, under the superintendence of Professor Silliman, Jun." Within the last twenty years geological surveys have been completed in eight of the States, and during the same period they have been carried forward in a greater or less degree in fifteen of the States, of which six are now in progress. Others have been suspended after one or more reports of progress had been made.

In the United States mining operations are for the most part in their infancy, and in certain regions new mineral resources are constantly coming to light. Beyond the mining of coal and iron, to which perhaps may now be added copper and lead, the mining enterprises undertaken have been more the result of chance and speculation, than

*New York Industrial Exhibition. Special Report of Sir Charles Lyell, presented to the House of Commons by command of Her Majesty, in pursuance of their address of February 6th, 1854. Harrison and Sons.

of any systematic effort to develope the mineral resources of the country. The geological and mineralogical surveys have mostly had for their object the determination of the limits of geological formations, with a general indication of the contained minerals or metals of value; and in regard to the mining interests, beyond those of coal and iron, it may be said that the most valuable general information possessed is of a negative character.

"The mining products which form the most prominent feature of the Exhibition consist of the different varieties of coal and metals, such as iron, lead, copper, zinc, and gold. The coal and iron-ores are derived chiefly from the eastern or Alleghany coal-field; the lead, from limestone and other rocks of silurian age, as well as from the metamorphic formations; the zinc, from metamorphic rocks in New Jersey; and the copper, from the metamorphic regions in the eastern part of the United States, but chiefly from the sandstone and trap regions of Lake Superior, the age of which has until recently been a subject of great difference of opinion among eminent geologists."

With the view of affording a just idea of the industrial resources and capabilities of this vast country, each special notice of raw mineral products is prefaced by a short sketch of the principal geological formations; the physical characteristics of each, its geographical extent, and its products, being also noticed further. In this Journal, however, it will not be possible to take advantage of Sir Charles Lyell's interesting and elaborate report, than to transcribe those portions which relate particularly to the economical applications of the products of the different formations—in which the members of the Society are more especially interested—and their use for manufacturing, building, ornamental, and agricultural purposes.

"The geological formations of the United States, which either afford materials for use, or give character to the portions of country which they occupy, may be enumerated in the following order, omitting the minor sub-divisions described in detail in the Geological Reports of the various States:—Alluvial and drift formations; tertiary; cretaceous; oolitic or liassic (jurassic?); new red sandstone (triassic); coal measures; carboniferous limestone, with other rocks below the coal-bearing strata; old red sandstone, or Devonian formation; upper silurian; lower silurian; crystalline, or metamorphic rocks of the Appalachian chain, chiefly recognised as metamorphic rocks of Palæozoic age; older metamorphic or crystalline rocks; trappean rocks."

The economical products from the alluvial and drift formations are gold, copper, iron ore, sands and clays, peat and shell, marl, &c. Gold "is derived from the destruction of certain auriferous metamorphic rocks. In the Eastern United States the gold-bearing drift is derived from a series or group of sub-crystalline metamorphic rocks, which may be denominated newer metamorphic, in contradistinction to the older system of metamorphic rocks." This drift is co-extensive with the formation from which it is derived. It has proved productive of gold in considerable quantities in Georgia, South Carolina, North Carolina, and Virginia. In California the gold-bearing drift or alluvium is derived from rocks of similar metamorphic character, and probably of the same age. These auriferous sands and gravels are very extensively distributed; the collections in the Exhibition showed samples of gold from nearly 200 different washings or localities in California alone. Copper, though occurring in the metallic form, and in that of some of its ores in the drift, has never been found of economic value in this formation. Magnetic iron-sand is a very general accompaniment of the drift in the vicinity of mountain ranges. It has not, however, been applied to economic uses. Bog-iron-ore is almost universal, though in quantities to be valuable only in comparatively few places. The hæmatite, so abundant along the base of the Alleghanies and in other localities, is sometimes, it would appear, associated with clays of this formation. Specimens of these from various places were shown in the Exhibition. Sands and clays fit for the purposes of making bricks and coarse pottery, are widely and abundantly distributed; many millions of bricks are annually produced. Owing to the iron contained in the clay, they are usually of a reddish brown; but in Wisconsin, particularly in the vicinity of Milwaukie, the clay produces bricks of a drab or yellowish colour, which are so highly prized that they are transported many hundreds of miles. In a few districts of the New England States peat is used for fuel to some extent; but generally very little use is made of it for that purpose in the United States. The peaty deposit or 'muck' of many of the swamp lands is much valued as manure, together with shell-marl derived from the decomposition of the shells of existing species of mollusks.

The economical products of the tertiary formations are brown hæmatite and ochreous iron-ore, manganese, fossil-fuel, fire-clays and porcelain earth, shelly marls, and green earth, and building materials. "It has been long known that there occurs in the United States an almost continuous belt from Canada to Alabama, containing hæmatitic iron-ores, ochres, &c., and clays of a peculiar character. This ore has been regarded as an aqueous or oceanic deposit, and as having been derived from the subjacent strata through the agency of thermal springs." "The hæmatite is usually compact, fibrous, and stalactitic, and always more or less enveloped in clays of various colours. Throughout New England this formation lies at the western base of the Green Mountains, and rests upon a metamorphic limestone, which is more or less associated with talcose or micaceous slate. From these beds the iron may have been derived, as it probably has been, by the action of thermal waters at the period of the deposition of the clays. In Pennsylvania these ores occur in depressions or fissures in the unaltered limestones of the lower silurian period, but associated with, or enveloped in clays; while farther to the south, however, the hæmatites of this character are associated with metamorphic strata. This deposit is one of the most important sources of iron ore, and the first worked in this country, furnishing an excellent material, and readily wrought. Specimens of the ore and of the manufactured iron were presented from Vermont, Massachusetts, New York, New Jersey, Connecticut, Pennsylvania, and Maryland. Black oxide of manganese occurs in numerous localities associated with the hæmatite above-mentioned. A bed of brown coal associated with the hæmatite and fire-clays occurs at Brandon, Vermont, and is there used as fuel. Lignites are found in many localities. Specimens of tertiary coal have also been brought from the country west of the Rocky Mountains, and from the Pacific coast. Kaolin, and various coloured clays, of greater or less purity, occur in this formation along the western base of the Green Mountains. They are mainly used in the manufacture of fire-bricks, and the stronger kinds of pottery. The clays are pure white, yellowish from iron, and pink-coloured from manganese. Clays of similar character are known in several localities in New Jersey. Another variety of clay, perhaps a little more recent in its origin, is, however, the most abundant in the State of New Jersey. It occurs in the neighbourhood of South Amboy, and is known as 'potter's clay.' From this source are supplied many of the manufactories of 'stone ware' in the United States. It is associated with or succeeded by beds of mottled clay and sand. Fire-bricks are also extensively manufactured from these beds. In New Jersey, Maryland, Virginia, and farther to the south, shelly marls, sometimes containing green earth, but frequently without, are used by agriculturists for enriching the soil. In this formation, sand, clay, and brick earth, supply the want of good building stones. A coarse friable sandstone occurs in some localities of the tertiary formation, but it is unfit for durable structures, as is fully shown by the Capitol at Washington, and some other buildings in which it has been used."

No economical products were sent to the Exhibition from the cretaceous formation, but "green-earth, green-sand, or, as it is usually termed, marl, of the cretaceous series, is extensively used in New Jersey and further

south by agriculturists. It is sometimes nearly or entirely destitute of fossil shells; while in some localities it has large numbers of them in its composition. The fertilising effects are mainly due to the contained potash, and perhaps also to sulphate of lime, derived from the double decomposition of sulphate of iron and the carbonate of lime from the fossil shells. Notwithstanding the immense extent of the cretaceous formation in the United States, no true chalk has been discovered. The calcareous beds thus far known are only useful for burning into lime, and are not used for building or ornamental purposes. Small deposits of iron, often phosphate of iron and iron pyrites, occur in this formation, but they are not of economical value. Lignite is found in small quantities, and fossil wood of several species is known. On the Upper Missouri and on the Yellow Stone Rivers the beds of lignite are extensive, and may at some future time be of economical value."

The chief economical products of the oolitic or liassic formation, are coal, mill stones, building stones, &c. "Coal seams are wrought in the vicinity of Richmond, and near the Deep River, in North Carolina. The whole thickness of the formation in Virginia is 800 feet, and the coal seams are confined to the lower 150 feet. In some places, two or three seams are known to occur, but in the Virginia basin, to the south of James River, these various seams are united into one vast bed of from 20 to 40 feet in thickness. The quantity of coal shipped from this basin, according to the best estimates at which we are able to arrive, is more than 150,000 tons annually. The coal seams in the same formation in North Carolina have been less explored, and thus far no considerable quantity of coal has found its way to market, for want of means of transportation."

The economical products of the new red sandstone formation are building-stones and copper and lead. "The Connecticut sandstone, though occupying a very limited area, furnishes at the present time more architectural and common building materials than perhaps all other geological formations in the country. The stone is supplied to all the maritime cities of the United States, and even to the interior. This sandstone is likewise quarried in New Jersey, and at some points on the Hudson River, in the State of New York. The only metals or ores of importance known in this formation are those of copper and lead. In several localities in Connecticut copper ores occur in this rock, though they have been wrought with but partial success. The principal mine in this rock in Connecticut is the Simsbury copper mine, in the town of Granby. The ore is vitreous copper, with small quantities of variegated copper and malachite. The mine has not been worked for several years. In New Jersey it would appear that this formation affords copper ores in many localities: but, notwithstanding numerous attempts to work them at different times, they have been finally abandoned. In Pennsylvania, in the counties of Montgomery and Chester, some of the productive veins of lead and copper ores, which lie near the junction of this formation with the gneiss rocks, penetrate both systems, while other veins lie wholly within one or the other set of strata. The localities mentioned afford large quantities of lead and copper ores; and some of the mines are producing valuable returns. The veins in the shales and sandstones are observed to be more prolific in copper than in lead; and the same lode, which is lead-producing in the gneiss, becomes copper bearing in the superior rock, or the lead ores become greatly reduced, and the copper largely preponderates. The principal ores are sulphuret and phosphate of lead, and sulphuret and carbonate of copper."

The coal formation, or coal measures, produces, as well as coal, iron ores, limestones, sandstones, and fire clays. "The rapid disappearance of the forests from the northern and middle portions of the United States, together with the steady and increasing advancement in manufacturing operations, have necessitated the general use of mineral fuel. The ratio of increase in the consumption of anthracite coal in the United States may be understood from the fact, that in 1820, 365 tons were used, while in 1847, the increased demand reached the amount of nearly 3,000,000 tons; and of bituminous coal during the same year, more than 2,000,000 of tons were consumed.* In 1851, it was estimated that the bituminous coal consumed in Pittsburg, and shipped to southern ports, including that from the Monongahela, amounted to more than 1,000,000 tons. The anthracite and bituminous coal-fields of Pennsylvania and Maryland, which form outliers in advance of the great coal field, are reached with facility from the Atlantic coast. On the south, the same coal field reaches within 200 miles of the Gulf of Mexico, and is there penetrated by streams which admit the transportation of coal from the mines to tide water, and the coal for the steam navigation of the Gulf will eventually be supplied in that direction. The western coal field is traversed by the Ohio, the Wabash, the Illinois, the Mississippi, the Missouri, and the Des Moines; thus the greatest possible facilities are afforded for transportation by natural navigation. The north-eastern boundary of the Illinois coal field reaches to within 80 or 90 miles of the southern extremity of Lake Michigan, and is connected with Chicago both by canal and railroad. The coals of the small districts included in Massachusetts and Rhode Island are anthracites of a low degree of combustibility. This character of the coal, together with the irregular condition of the beds, in the midst of a much disturbed and highly metamorphic region, have caused them to be little sought for; and of the ten or twelve workings commenced at different times, few have been continued. The anthracite basins of Pennsylvania produce anthracite of a superior quality, and from its accessibility it has furnished a large part of the fuel used in the towns and cities of the Atlantic coast. A specimen of anthracite coal of enormous size, from the mammoth vein, Wilkesbarre, Pennsylvania, was presented at the Exhibition by citizens of that town. This mass showed a vertical section of the vein, being a shaft 5 feet square at the base and 30 feet high, weighing about 60 tons. Several other large masses, one 10 feet long by 4 wide, and 3½ high, were exhibited from the same locality, and specimens of the same bed from other localities. Coals from the Carbondale and Pittstown mine, a collection of about sixty varieties of anthracite from Schuylkill county, and several other specimens of coal, were presented at the Exhibition. Bituminous coal from Maryland were exhibited in large masses, showing the thickness of beds, 11 and 15 feet respectively. Numerous specimens of bituminous coal accompanied samples of iron ore from several places in Pennsylvania. The coal fields of the United States contain rich deposits of the iron ores which usually occur in the coal measures. These are chiefly the carbonate and peroxide of iron; the latter mainly resulting from partial decomposition or change of the former, which is argillaceous, calcareous, or siliceous in its composition. In Pennsylvania and in Ohio, where these ores are wrought to a greater extent than elsewhere, the beds appear to be inexhaustible, and will supply for an indefinite period the requirements of advancing physical improvement and civilization. In Tennessee, Alabama, and Western Virginia, the coal formation abounds in iron ores. In the western coal field less is known of this connection of coal and iron, the extent to which iron is manufactured being far less than in the east. The geological survey of Illinois, now in progress, has already shown that this state is richly supplied with iron ore in the midst of her inexhaustible coal fields, although there are as yet but two furnaces in the state. In Missouri, iron from these ores is manufactured to some extent, yet too little is known to warrant a conclusion as to their abundance. The iron ores from the coal formation presented at the Exhibition were chiefly from Pennsylvania; and from that state was furnished a very full col-

*R. C. Taylor's "Statistics of Coal."

lection, not only of the ores from the coal, but from other formations. The collection comprised the ore and furnace products, viz., ore, coal, slag, pig iron, as well as manufactured iron; ores from geological formations below the coal, and occurring in the midst of the coal-fields, being here exhibited in company with the coals by which they are smelted. Iron ores were also exhibited from different parts of Ohio. In nearly every part of the coal-fields there occur beds of limestone of marine origin, alternating with shales, sandstones, and beds of coal. In some places the coal and limestone are in actual contact; and some of the ores occur in connection with the limestones. These beds of limestone furnish the necessary flux for the reduction of ores of iron, and also lime for ordinary building-purposes. The beds of sandstone, alternating with the shales and coal-seams, often furnish an excellent and durable building material. Some of the more friable sandstones, which are free from iron, are used for glass-making. Some of the coal-seams are underlaid with beds of fire-clay, of greater or less thickness; and in some parts of the formation there are extensive beds of fire-clay not directly associated with coal-seams. This material is used for fire-bricks, stoneware or pottery, water-pipes, and drain-pipes, and is everywhere co-extensive with the great coal fields."

The economical products of the carboniferous limestone, are lead and building stones. "In the southern part of Illinois, where the strata are much disturbed, this formation is traversed by several veins which have been worked for lead. The lodes contain galena, blende, fluor-spar in large quantities, calc-spar, &c. Lead ores likewise occur in the carboniferous limestone of Tennessee and Alabama, but not in quantities sufficient to be wrought. This limestone affords an excellent and cheap material for building, easily quarried and dressed. Some of the beds are extremely fine-grained and compact in texture, admitting a good polish, as do also some portions of the lower beds of the limestone, which are oolitic in structure. The red shale of this formation is economically important from being the repository of iron ores which are wrought in many places in Pennsylvania, not only along the borders of the coal measures, but at numerous points within the basin, where the superincumbent strata are cut through. The ores of the red shale are chiefly carbonates of iron, with variable proportions of silica, alumina, &c. They yield from 60 to 80 per cent. of carbonate of iron, and some of them yield peroxide of iron in about the same proportion."

The principal materials of economic value in the old red sandstone or Devonian formation are iron ores, limestone for lime, hydraulic limestone, building stones, sandstone for building and for fire stones, flagging stones, &c. "At the junction of the Chemung and Cattskill Groups, Nos. VIII. and IX. of the Pennsylvania Survey, there occur bands of fossiliferous iron ore. These ores yield from 30 to 50 per cent. of peroxide of iron. Iron ores also occur associated with the limestone at the base of No. VIII. of the Pennsylvania Survey. These ores are described as of good quality and abundant in quantity, in the State of Pennsylvania, and they occur still further to the south. In the western extension of the limestone described, no ores of importance are known to occur, though the line of junction with the rock next below it is often marked with an ochreous deposit."

The economical products of the upper silurian rocks, are iron-ore, lead, zinc, and copper, building stone and mill-stones, and salt. The substance of greatest economical importance in this part of the system is iron-ore. "The strata known in New York as the 'Clinton Group' contain one, and sometimes two distinct beds of iron-ore, alternating with beds of limestone and shale. This iron ore appears to be nearly co-extensive with the formation. In the western part, however, where the formation has become interrupted and thin, iron ore is known to exist in only a single locality in Wisconsin. The ore is fossiliferous, as are the adjoining bands of limestone, and often highly calcareous in its composition. It is much prized and extensively used in the manufacture of iron in Pennsylvania and New York. Small quantities of iron ore occur in the superior limestones (No. VI. of Pennsylvania Surrey) in Pennsylvania, but throughout the large part of the area occupied by these limestones, no ore of importance is known. Galena, blende, and copper-pyrites occur in the Shawangunk conglomerate. At the present time a lead-mine is wrought in this rock, in the Shawangunk mountain in Ulster county; the products of the mine are galena, copper-pyrites, and a small quantity of blende. This mine has afforded some remarkably large masses of galena, one of which weighed 16,000 pounds. Further to the south-west, within the State of New York, a vein or bed of sulphuret of zinc in the same formation has been somewhat extensively wrought. Limestone everywhere abounds in this part of the system, and some of the finest and most durable structures in the country are made from limestone of the Niagara group; this is evidenced in the great works along the line of the Erie Canal; and the facility with which this rock is quarried, and the proximity of navigation, have caused its extensive use; it may be recognised even in the city of Chicago, at a distance of 1,500, miles, by way of the lakes, from its source in Western New York. The Medina sandstone and Clinton groups afford an abundance of fine flagging-stones, as well as, in some parts, excellent building stones. Millstones of good quality have long been manufactured from the compact conglomerate of the Shawangunk grit; this rock, in earlier treatises on American geology, was supposed to be identical with the millstone-grit of England. The Onondaga Salt-group, in the State of New York, yields brines of great strength, from which large quantities of salt are manufactured, affording an extensive business as well as a large revenue to the state. The salt manufactured at these *salines* in 1797, amounted to 25,474, bushels; since that time the quantity has been steadily increasing; in 1852 it amounted to 4,922,533 bushels, and in the present year the quantity will extend beyond 5,000,000 of bushels. Although this formation yields brines for a distance of 200 miles or more along its northern outcrop, yet those which are of sufficient strength to be used in the manufacture of salt are confined within a small area in the neighbourhood of Syracuse, New York. It should be observed, that the wells from which these brines are obtained are bored in drift or alluvium, and in only a few cases reach to the rock *in situ*. The brine occurs in the drift, having percolated from the superior beds of the group which rise above the level of this valley on the south; and its quantity or quality is not improved by penetrating the strata which lie below the gravel."

The economical products of the lower silurian rocks are iron ore, lead ores, copper ores, marble, limestone and building stones, and grindstones, and flagstones. "The most important economical product of the lower silurian formation is galena, or sulphuret of lead. The lead-bearing rock, or 'galena limestone' of Wisconsin, Northern Illinois, Iowa, and part of Missouri, is a lower silurian limestone, which has yielded immense quantities of lead ore for many years past. The lead ores of Missouri occur in the same rock as those of northern Illinois, Wisconsin, and Iowa, and under similar conditions. Veins of galena and blende are known in several localities of the Trenton limestone in the northern part of New York, but these have never been wrought with profit. Veins or lodes of sulphuret and carbonate of copper occur in several localities within the limits of the lead region and in the same association, particularly at Mineral Point, Wisconsin, where these ores were formerly wrought, but ultimately proved unprofitable; they occur likewise in Missouri They are confined to a rock of moderate thickness, and are productive in their linear extent rather than in depth. Copper ore has also been found in a lower position in the lower magnesian limestone of Wisconsin, but only in a single locality of small extent. On the south shore of Lake Superior, the lower or Potsdam sand-

stone is associated with extensive beds of conglomerate and an unbroken range of trap rocks which are copper-bearing. The sandstone and conglomerate contain some ores of copper, but the metallic copper occurs mainly in the trap rocks; none of the veins in sandstone or conglomerate are worked at this time. Some of the beds of limestone afford a black marble of excellent quality, which is extensively used, with marble of other colours, for flooring in halls and public buildings, and also for other purposes. For structures requiring heavy blocks, the lower limestones afford an abundant supply of excellent quality throughout their northern and eastern range, but are of far less value in this respect in their western extension. The Potsdam sandstone furnishes excellent and durable building stone and fire stone. The slates of the Hudsón River group afford roofing slates in numerous localities in Vermont, New York, and Pennsylvania, and probably farther south. These usually occur on the margin of the metamorphic belt; and, when either entirely unaltered, or too much changed by metamorphic action, they are unfit for this purpose. Grindstones of good quality are made from the sandstones of the Hudson River group. Flagging stones are also abundant in many parts along the eastern exposures, and as far west as Lake Ontario. The thin-bedded Potsdam sandstone in many localities affords good flagging stones. The products of the lower silurian rocks in the Exhibition were encrinal marble from Lake Champlain, and also roofing slates from the semi-metamorphic slates of this formation."

The economical products of the upper metamorphic rocks are gold, iron ores, chromic iron ores and serpentine, copper ores, tin ore, lead ores, silver, building stones, flagging stones, millstones, whetstones, statuary marble, and mica. "The most prominent and important product of the metamorphic rocks of this age is gold, which occurs more or less abundantly throughout the whole extent of the formation from Canada to Georgia. The gold is obtained either directly from the rocks themselves, or from the auriferous debris derived from their destruction by natural causes. At the present time the gravel and sand, resulting from the disintegration of these rocks, are searched for for gold on the Chaudière River in Canada; and gold has been found in the rocks and in the gravel in several places in Vermont and Massachusetts; though they have never proved productive of any considerable amount. From the facts here adduced, it appears to be demonstrated that the gold is not indiscriminately distributed through all the rocks of this age, but is in reality confined to a comparatively narrow belt. The iron ores directly connected with these rocks are not often productive; though, from the decomposition of iron pyrites and other causes, beds of iron ore of secondary origin frequently occur. Some iron ores of this formation occur in workable quantities in Vermont and New Hampshire; and one or more beds of little economical value are known farther to the south in Massachusetts. Associated with the rocks of this age occurs chromate of iron in numerous localities, from the northern limits of the United States, as far south as Virginia, and probably still farther. These ores have been wrought in Maryland and Pennsylvania. In connection with these ores occur chlorite beds and serpentine rocks, the one apparently co-extensive with the other. The part of the formation bearing these products, however, is not continuous, but occurs at intervals where certain beds existed in the original sedimentary deposits. The serpentines, or *Verd antique*, are of beautiful varieties; and among their localities may be mentioned Millford, near New Haven, Connecticut, and Cavendish and other towns in Vermont. Sulphurets and carbonates of copper frequently occur in the gold region of Virginia and North Carolina, and in the same formation in Maryland. The copper ores of Bristol, Connecticut, and some other localities in that State, must also be referred to rocks of this period. The tin ore (oxide of tin) described by Dr. Jackson as found in the town of Jackson, New Hampshire, occurs in rocks of this age. Tin ore in small quantities often accompanies the gold in Virginia and North Carolina. Galena, carbonate, sulphate, and phosphate of lead are known in rocks of this age, but their economical value has never been fully tested. Sulphuret of lead occurs in considerable quantities in some of the copper mines recently opened in Maryland. Native silver occurs in Davidson county and other localities in North Carolina. The firm and durable syenite of the neighbourhood of Boston, known as Quincy granite, so much prized as a building material, and so extensively used, belongs to this formation. Still further eastward, in the State of Maine, building materials of this kind are wrought to a considerable extent. This syenite is usually of lighter colour than that of Quincy, but becomes darker by the action of the weather. In nearly every part of this formation flagging stones and step stones of good quality are obtained. The syenite in some localities is sufficiently quartzose to produce good millstones, which are manufactured in the neighbourhood of Salem in Massachusetts, and other places. The talcose and mica slates of this age are often sufficiently siliceous to be used as whetstones or hones. White and variegated marble of various qualities are found in these formations. They result mainly from the metamorphism of several beds of lower silurian limestone, which vary in character in their normal condition. In the State of Vermont some beds of statuary marble of excellent quality have been found. Fine marble occurs in numerous localities between the northern line of Vermont and the city of New York, and large quantities are obtained from Vermont, Massachusetts, Connecticut, New York, and Pennsylvania. The marble from these localities is extensively used for building and decoration, &c., the coarser varieties for floor-tiles and ordinary building purposes. Mica, occuring in the metamorphic rocks, or associated with belts of crystalline intrusive rocks, is a substance of economical value. Large quantities are annually used for the doors and sides of stoves, which are so extensively manufactured in the United States. The entire supply at the present time is obtained from two localities in New Hampshire, Grafton and Acworth."

The economical products of the older metamorphic rocks are iron ores, copper ores, lead ores, zinc ores, phosphate of lime, porcelain, earth, marble, and building stones, fire stones, hones, &c., and plumbago and crystalline minerals. "In point of economical resources, this formation, both in Canada and the United States, is perhaps second only to the coal formation. The magnetic iron ores from Canada, forming immense veins or masses, so fully illustrated in the London Exhibition of 1851, were from the rocks of this older metamorphic period. This mineral, either as magnetic protoxide of iron, or mingled with anhydrous peroxide in various proportions, is characteristic of the formation everywhere. In Northern New York the mountains are traversed by veins or beds of the same ore, which have the appearance of intercalated beds running parallel to the schists, and having a width or thickness of from 2 or 3 feet to more than 100 feet, and can often be traced for a mile or more in length. Numerous beds are opened in the vicinity of Lake Champlain, where the ore is largely used in manufacturing iron, and whence also it is shipped southward to the valley of the Hudson, where it is used for smelting with inferior ores, to improve the quality of the iron. The ores of the Adirondack region, in Northern New York, have been successfully used in the manufacture of very fine iron and steel, which were likewise shown in the London Exhibition of 1851. In the western part of the metamorphic region here described, the iron ores are chiefly the peroxide or specular iron ore. In the southern part of the same State, extensive beds of magnetic oxide of iron occur in the same rocks, and are wrought to considerable extent. In New Jersey, Pennsylvania, and Maryland, these magnetic ores are wrought; but farther south they seem to have attracted little attention. On the southern shore of Lake Superior the

rocks of this class contain extensive beds or veins of mixed magnetic ore and peroxide of iron. In the western extension of the same formation, and in the vicinity of Montreal and Bad River, in Wisconsin, beds of magnetic iron ore are known to exist. The iron ores, a mixture of magnetic iron and peroxide, of the Iron Mountain and Pilot Knob in Missouri are derived from rocks of the same age. Similar ores occur in the metamorphic region of Arkansas. The rocks of this age in Northern New York have yielded small quantities of copper ores in several places, but no mines have been profitably wrought. The Bruce Mine, on Lake Huron, and others on the northern shore of Lake Superior, which yield copper, chiefly from the sulphurets, are in this formation, or in the immediate metamorphic division recognised in Canada by Mr. Logan. The lead ores of Rassie and its vicinity, in Northern New York, occur in rocks of this age. The lead and copper mines of Montgomery and Chester counties, Pennsylvania, already mentioned in connection with the New red sandstone, occur in the gneiss rocks of this system. Those veins promise to yield largely of these two metals. Zinc blende often occurs with the lead ores in this formation; and veins of blende, sometimes with a small admixture of galena are found. Thus far this ore has proved of no economical value. The red oxide of zinc, and franklinite of New Jersey must be regarded as of this period. The red oxide is largely used in the manufacture of the white oxide of zinc, and the mixture of this ore with the franklinite, ground in oil in its natural state, forms a brown paint which is much used. Although producing metallic zinc of excellent quality, it is not manufactured at the present time. The franklinite of the same mine has, it is said, of late been successfully used in a process by which the oxide of zinc is obtained and the iron reduced, both processes being accomplished by the same furnace operation. Phosphate of lime in fine crystals, and in a massive form, occurs in rocks of this age. In one locality in Northern New York, a vein or bed of this mineral was discovered, which at one time promised to prove of great value for agricultural purposes. It has, likewise, been found in considerable quantities in New Jersey. Granite proper forms but a small part of the extent of country occupied by the metamorphic rocks of the United States. It occurs in both the formations as intrusive bands, dykes, or more extended masses. Many of these granite rocks are very coarsely crystalline, and consist mainly of feldspar, with small proportions of mica and quartz. The feldspar, whether in a partially decomposed condition or in its natural state, is largely used in the manufacture of porcelain and the finer kinds of earthenware. The lower metamorphic rocks usually afford an abundance of rather coarsely crystalline limestone, with occasional beds of finer quality. None of it, apparently, can come under the designation of statuary marble; it is, however, adapted to many purposes for which the coarser varieties of white or clouded marbles are used; and in many localities it is a good building material. In Northern New York it is sometimes mixed with serpentine, which gives it a variegated appearance. On the southern shore of Lake Superior these marbles are described as of a beautiful pink colour, traversed by veins of red; others are blue and dove-coloured, and beautifully veined. The gneiss and granite from this formation afford excellent building materials of a great variety and colour; and in many places these may be quarried in massive blocks. The situations where the best examples occur are not easily accessible for the means of transportation to the larger cities. The talcose slates of this period often furnish good fire-stones, which, when the divisional planes of the rock are not of too frequent occurrence, and when blocks of sufficient dimensions can be obtained, may be used for the construction of iron furnaces. Sometimes beds of a fine material, as potstone or compact steatite, are found associated with the limestone. Some of the slates contain sufficient silica to adapt them for hones or whetstones. This material, of good quality, has been found on the south shore of Lake Superior. Plumbago occurs in considerable quantities in rocks of this age in Northern New York. In some localities the rocks of this period are extremely rich in beautiful minerals. Amongst these may be mentioned fine crystals of apatite, zircon, spinelle, sphene, augite, tourmaline, &c. Labrador feldspar, in large crystalline masses, is not of unfrequent occurrence in Northern New York. This mineral, when polished, is very beautiful; and some of the finer specimens have been set in gold and worn as ornaments."

The economical products of the trappean formation are copper, silver, and building stone. "Native copper in large quantities is obtained from the trap rocks of the Lake Superior region, where numerous mines are opened on the south shore of the lake. The copper occurs in sheets of greater or less thickness, in veins cutting the trap-range nearly at right angles, and associated with various vein stones. These sheets of copper are of variable extent, weighing from a few pounds to eighty tons. The produce of copper from the mines of Lake Superior, during the year 1853, will reach 4000 or 5000 tons. A mass of native copper in the Exhibition from one of these mines weighs 6,300 pounds; it is cut upon four sides, and the thickness between the two natural surfaces is more than two feet; this was cut from a mass weighing 40 tons. The sulphurets of copper in the porphyritic trap on the south shore of Lake Superior, have not yet been wrought to any great extent. The native copper contains a small amount of native silver, and this metal also occurs in small nodules or irregular masses in the copper, or attached to its exterior surface, and also in the accompanying trap. In these cases the quantity of silver is usually small, but some masses of large size have been discovered in the *debris*, associated with lumps of native copper. More recently, a vein of silver has been wrought upon the north shore of Lake Superior. Specimens from this place were exhibited in the Exhibition. The trap rocks, which are traversed by numerous joints, separate into irregular angular blocks used for rough walls, and to some extent for buildings. The rapid breaking down of these rocks along the palisades of the Hudson river, by the action of water and frost, renders them accessible; and large quantities are annually transported to the city of New York and its vicinity."

"From the foregoing sketch of the economic geology of so large a portion of North America, it will be seen that the great metalliferous belts of the United States are the two nearly parallel and contiguous ranges of metamorphic rocks, which extend almost uninterruptedly from the north-eastern extremity of the United States to Alabama. To these two principal zones must be added an area of considerable breadth in Northern New York, one of similar character on the south shore of Lake Superior, a small area in Missouri, one in Arkansas, and another in Texas. On the western side of the Continent we have the metalliferous belt of the Pacific coast, extending through California and Oregon. Too little is known of the Rocky Mountains to enable us to speak with any degree of confidence with regard to their future mineral produce.

"Permanent and productive mines of the metals will not be found beyond the areas which have been thus hastily sketched out. The general depositories of mineral wealth, therefore, are within moderate proximity to the coasts. The copper and iron region of Lake Superior lies upon navigable waters, communicating by artificial channels with the Atlantic. The coal formation, the source and foundation of every enterprise, stretches almost the whole length of the country, from the great lakes on the north to the Gulf of Mexico on the south.

"The natural distribution, therefore, of these sources of wealth and power, combined with the physical features of the entire country, leave nothing to be desired with respect to the materials and incentives for its physical progress and development."

ON THE POSITION OF FIRE-PLACES.

By Dr. Neil Arnott, F.R.S.*

This is the fit place for remarking on the fashion lately introduced in this country of placing the firegrates much lower down than formerly—in some cases, on the very hearth—the reasons usually assigned being that a low fire burns better, or gives out more heat from the same quantity of fuel, than a higher; and, because lower and nearer the floor, that it must warm the carpet better, and so lessen the evil of cold feet. Now, both these suppositions are curious errors or delusions, having their origin in popular misconceptions respecting heat, and particularly respecting the radiation of heat.

Radius is the Latin word for the spoke of a wheel, and anything which diverges or spreads around from a centre, in some degree like spokes, is said to radiate. Light and heat are of this nature; the portion of either which passes in a straight line from the centre is called a ray.

The simplest observation teaches all that a lamp placed in the middle of a room radiates its light and heat nearly equally in all directions; and most persons are aware that if an opaque mirror be placed close to a lamp on one side, it not only intercepts all the rays that fall upon it—and that means nearly half of the light given out—but it returns or reflects these rays back in contrary corresponding directions, and nearly doubles the illumination in those directions.

Most persons, also, have observed that if a fire, or a red-hot mass of metal, be placed in free space, it radiates its heat as well as its light nearly equally in all directions; but many do not learn, by their unaided observation, that if a surface of any substance, like firebrick, which strongly resists the passage of heat through it, be placed near a fire, it not only intercepts the heat-rays falling on it, but after absorbing them, and so becoming heated, often to redness, it then reflects and radiates back the greater part of the heat, almost as if it were additional hot fuel in the fire, and thereby nearly doubles the warmth felt in directions away from the surface.

Neither does common observation make persons aware of the truth, that of the heat produced by combustion in a common fire, one part—being somewhat more than half—is diffused, like the light, by radiation, into the open space around, and the remainder is given, by contact and conduction, to the air which supports the combustion, and to the solid material of the fire-place. Thus, with a common open fire-place, it is the radiant heat almost alone which warms the room, the remainder either at once combining with the burned air or smoke, and passing up the chimney, or being given by the heated grate to pure air, which touches that, then passing into the chimney with the smoke.

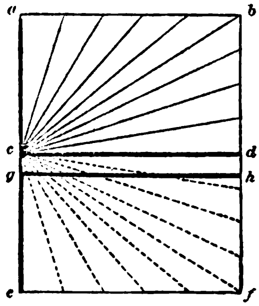
And, lastly, many persons do not at first learn the truth, that the rays of heat passing through pure or transparent air do not at all warm that air, but warm only the solid or opaque bodies by which the rays are intercepted, and that thus the air of a room is warmed only at second-hand, by contact with the solid walls and furniture which, having intercepted the heat-rays, have themselves first become heated. Yet most educated persons know similar facts, such as that the sunbeams, bringing both light and heat to the earth, as they descend to warm the hottest valleys or plains of the earth, pass through the upper strata of the atmosphere, which are always of a temperature much below freezing. This is proved by the fact that all lofty mountains, even under the equator, are capped with never-melting snows, and that the higher the peaks are—and, therefore, the nearer to the sun—the colder they are. Thus, also, all persons who have attended to the subject know that aeronauts, in their balloon-car, if they mount very high, would be frozen to death but that they are protected by very warm clothing. Another fact of the same kind is, that a glass globe, filled with cold water, or even ice, may in the sun's rays be used as a burning-lens.

These explanations being premised, the two popular delusions respecting the low fires become at once apparent.

1st. The supposition that fuel burnt in a low fire gives out more heat, has arisen from the experimenter not reflecting that his hand held over the low fire feels not only the heat radiated from the fire itself, but also that reflected from the hearth close beneath it, which second portion, if the grate were high, would have room to spread or radiate downwards and outwards to the more distant floor or carpet, and to warm them.

2nd. The notion that the fire, because near the floor, must warm the carpet more, springs from what may be called an error in the logic of the reasoner, who is assuming that the hearth, floor, and carpet, being parts of the same level, are in the same predicament—the truth being, however, that in such a case the hearth within the fender gets nearly all the downward rays, and the carpet almost none—as a candle held before a looking-glass at a moderate distance diffuses its heat pretty uniformly over the whole, but if moved close to one part of the glass it overheats, and probably cracks, that part leaving the rest unaffected. A low fire on a heated hearth is to the general floor or carpet of a room nearly what the sun, at the moment of rising or setting, is to the surface of a field. The rays are nearly all shooting upwards from the surface, and the few which approach it slant obliquely along, or nearly parallel to, the surface, without touching, and therefore without warming it.

The annexed diagram serves to elucidate these facts.



c represents the fire-place or centre of radiation, with rays diverging from it into all free space around.

a c the wall in which the grate is set, and which can receive none of the direct rays,—as is nearly true of the floor also if the fire be on the hearth.

a b the ceiling.

b d the wall opposite to the fire.

c d the floor, with the fire on or close to the hearth. If there were no floor at all these rays would shoot as abundantly down to the bottom and walls of the room below, as to the ceiling and walls of the room above; but the hearth-stone of the floor, *c d*, first intercepts all the inferior rays, and then radiates them up to the ceiling, leaving the floor unsupplied unless by secondary radiation from the ceiling and walls.

g h represents a floor at a moderate distance below the fire. It is seen, by where the ray-lines intersect this floor, that much of the heat of the fire must spread over it, and chiefly between the middle of the room and the grate where the rug is, and where the feet of the persons forming the fireside circle are placed.

* The subject of this article was referred to by Dr. Arnott, during the reading of his paper on the Smoke-consuming Fire-grate, on the 10th of May last; and as it has been deemed important, he has been good enough to give his remarks in writing, which may be taken as forming part of his original paper.

Striking proof of the facts here set forth is obtained by laying thermometers on the floors of a room with a low fire, and of a room with the fire, as usual of old, at a height of about 15 or 16 inches above the hearth. An experiment, tried in two such rooms, in both of which thermometers on the pianofortes, four feet above the floor, stood at 62°, shewed the carpet, not far from the hearth, to be at 56° with the low, and at 73° with the high fire.

As would be anticipated by a person understanding the subject aright, low fires make cold feet very common, unless to those who sit near the fire with their feet on the fender; but deceived by their fallacious reasoning, the advocates are disposed to blame the state of their health or the weather as the cause, and they rejoice at having the low fire, which can quickly warm their feet when placed near it. A company of such persons seen sitting close around their fire with thankfulness for its warmth near their feet, might suggest the case of a party of good-natured people duped out of their property by a swindler, and afterwards gratefully accepting as charity from him a part of their own property.

Many persons have been prevented from detecting the truths connected with low fires by the fact, that where the chimney breast or opening is also made low, the mass or stratum of comparatively stagnant warm air in the room is deeper or descends lower than where the chimney opening is high, and the room thus arranged may be, except near the floor, warmer than before. But advantage from this arrangement is often missed by the chimney throat being left too wide, causing strong cold draughts below, and where there are many persons in the room, the possible good is more than counterbalanced by the ventilation above being rendered in proportion more faulty. In the new smokeless grate, there is the advantage of a low chimney opening, although with a high fire, and yet the ventilation is maintained perfect for any amount of crowd by the ventilating valve, placed near the ceiling of the room.

It may be observed here, that the smoke-consuming grate exhibited in the Hall of the Society of Arts, is of small size, fitted for a room of moderate dimensions, and was originally intended to be placed for inspection on the table, merely to show the principle, but the Secretary, judging that it would be more interesting if seen in action, desired it, although so disproportionate, to be fixed for the time in the fire-place of the large Hall. That grate was constructed by Messrs. Bailey, of Holborn, but the deviser hopes, as the whole arrangement is so simple, that intelligent manufacturers everywhere will be able to make it perfectly. He deems himself bound to publish soon, any further instruction with regard to it, which further and more varied experience may suggest.

FIRE-ARMS AND PROJECTILES: RECORDED PATENTS.

(From the *Spectator*.)

In proportion as nations become intelligent, wars diminish in brutality. The art of slaying is reduced to a kind of chess game, in which those possessing the best weapons and the best powers of calculation, even with inferior numbers, win the day. And in proportion as victory becomes certain, there is less desire on the part of the intelligent to obtain it save for worthy purposes, and the unintelligent have a proportionate fear of stirring up strife. We may therefore assume that by the time war has been made a perfect science, it will cease to exist save as a means, when other means fail, to coerce barbarians into good behaviour. On this reasoning, they also are benefactors of their species who gave their time and energy and skill to perfect the processes of destruction and render weapons of war unerring and more and more widely destructive. Swindlers thrive through the ignorance of honest people, and coarse brutes overpower refined people who are unskilled in scientific resistance. But the club is no match for the pike; the musketeer falls before the rifle; the regiment of cavalry is scattered like chaff before well-served artillery; and if we find that artillery is vanquished by the bearers of needle guns and Minié rifles, it is merely a proof that the science of artillery is in arrear and needs more studying.

We have been led to these remarks by thoughts of the existing war, and the processes by which the civilized nations of the West and South are to wage it against the barbarians of the East and North. No former age of the world has beheld such a spectacle as that of nations joined in arms for no purposes of ambition but for the pursuit of justice, to put down the non-progressive element of mere military centralized despotism, and give full scope to the advancement of general humanity in the arts conducive to human happiness.

In the furtherance of this righteous war, attention has been strongly turned to the question of improvement not merely of the art of war but of the implements by which war is to be carried on in future. The Board of Ordnance has for this reason called on the Commissioners of Patents to furnish a volume comprising all the objects aimed at by patentees from the earliest period; wisely judging that this would form a good index of the essential points in which improvement is desirable, and that it would also furnish many valuable contributions towards the accomplishment of those desirable objects. That volume is now before us.*

* * * * * * *

We have now before us a result of the labours of the servants of the Commissioners in the printed specifications and lithographed drawings of two hundred and sixty-two patents for improvements in projectiles, fire-arms and their appurtenances, gunpowder, shells, rockets, pikes, bayonets, armour, &c. The list commences in the year 1718, in the reign of the First George, and ends in 1852, a period of one hundred and thirty-four years. Curiously enough, the first patent on the list is for a revolving breech gun or cannon, to contain several charges; and one of the last is the patent of Colonel Colt, for a similar object applied to hand guns and pistols. Strange to say, there are not wanting persons who would vitiate the claim of Colonel Colt to originality for his efficient weapon, because the quaint James Puckle devised an inefficient one a hundred and thirty years earlier. Colonel Colt's weapon is a rifle-barrelled revolving detonator, self-acting, with a lever ramrod, occupying the minimum time in loading and discharging, and without need of wadding—a practical implement of war. The weapon of James Puckle is that of a humorist—a kind of demi-culverin on a tripod, to be planted like a telescope, and to be discharged by a linstock with one hand, while the revolving crank is worked by the other, and requiring to be primed for every separate discharge. The specification is partly in rhyme—

A Defence.

"Defending King George your Country and Lawes,
Is defending yourselves and Protestant Cause,
For Bridges, Breaches, Lines, and Passes,
Ships, Boats, Houses, and other Places."

Amongst other things, the drawing and letters of reference contain the following:

"Fig. 16. The plan of the chambers of the gun for a ship for shooting square bullets against Turks.

"Fig. 17. For round bullets against Christians."

When the biography of inventors shall be published, we shall be curious to examine that of Mr. James Puckle. The style of the drawing and the use of the term "trepieds" give a strong suspicion that Mr. Puckle had received "a communication from a foreigner residing abroad." The patent was contemporaneous with the South Sea Bubble.

In analyzing the subject matter of the two hundred and

* Specifications of Patents of Inventions relating to Fire-arms, Projectiles, &c. Printed by the Queen's Printers.

sixty-two patents, we find that eighty-nine, ranging from 1775 to 1852, are specifically devoted to the various modes of discharging fire-arms by flint and detonation, leaving out of the question matchlocks and wheel locks. Under the head of fire-arms we have thirty-one inventions, from 1772 to 1852, including sundry adjuncts to fire-arms. For cannon and mortars, from 1728 to 1838, we have seven patents. There are five for machinery for boring and rifling from 1789 to 1852. Gun-carriages and wood machinery, including the patents of the late Sir Samuel Bentham, are seventeen in number, ranging from 1753 to 1852. Shot and shells are eleven, from 1758 to 1852. The manufacture of gun-barrels and cannon is the subject of twenty-three patents, from 1798 to 1852. Breech-loading-cannon and arms have occupied fourteen inventors, from 1741 to 1852. Revolving or repeating fire-arms occupy nine patents from 1718 to 1851. Air and steam guns are three in number, from 1824 to 1847. There is one patent for a long bow, and one other for an elastic string of caoutchouc to propel arrows and darts. Pikes, bayonets, shields, and breast-plates, are six in number, from 1804 to 1846. Shot-pouches, cartridge boxes, and the appurtenances of warfare and the chace, occupy twenty-five patents, from 1777 to 1842; and gunpowder fuzees and rockets, twenty patents, from 1766 to 1852. There are about a hundred more patents for similar objects under the new law, to which we may take an early opportunity of referring.

Amidst all this mass of matter are contained the chief improvements that have brought the science of projectiles to its present comparatively palmy condition; and of course much rubbish is to be found mingled with them, the result of puerile imaginations. To form a complete analysis of these specifications, and point out the important principles involved, and what portions are in conformity with the principles, would require considerable labour. Though much has been done, there is still much more remaining to do; and although we are only repeating a truism in saying that the warlike skill and practical advance of Great Britain are equal to the rest of the world, yet there is no doubt that what remains to be unfolded in the use of nature's powers will yet throw into the shade all that now excites praise and wonder. Neither our great guns nor our small-arms are yet what they should be either as regards safety or efficiency; and it will only be when original minds can see the probability of recompense that they will betake themselves to the work of improvement in this branch. If we examine the structure of fire-arms, we find that the greatest improvements have been in weapons used by sportsmen; for the simple reason that the general public was the patron. In weapons for war, the inventor could only depend upon Government officials, not individually interested in progress. The result has been, that national weapons have remained in an inferior condition; and at last a Parliamentary inquiry has taken place, and propositions have been made to erect Government factories for the manufacture of weapons, to the exclusion of private factories.

* * * * * * *

There needs much a completer exposition of the principles and system that should govern the mechanical arrangements for national defence in employing the powers of nature after the most useful fashion. A piece of field-artillery, as we at present behold it, is one of the most inartificial of modern contrivances—in fact, it is not modern at all. With the exception of its size and better manufacture, it is in principle no advance on what was done by the Mahometan conquerors at the first siege of Constantinople. It is an exemplification of mere brute force in all its parts, wheel, axle, carriage, cylinder, and linstock. The men only, with their greatly-developed skill, are in advance, and their weapon is no longer worthy of them. Compared to what field-artillery should be, it is "brown Bess" to the Minié rifle.

Meanwhile, we hail it as a sign of better times, that the ordnance department has called forth this volume from the Commissioners of Patents; and we trust that it will be largely circulated. If we are rightly informed, an appendix was in hand by the late Mr. Prosser, which we trust will yet be added to this collection. We should be glad if our words might be the means of turning the attention of Government to the fact, that not merely are the national weapons manufactured in an inferior manner, —not merely are the muskets of the army the very opposite of what Colonel Colt seeks to attain,—exactitude of parts, so that all parts of one musket will fit all parts of another,—but the principle of construction is of an imperfect kind; and that the imperfection of principle runs very largely through the whole range of projectile weapons. Machinery and methods are very far in arrear of the possible; and these defects must sooner or later be remedied in Government workshops, in order to procure the samples whereby private individuals may be enabled to execute Government contracts. If we do not bestir ourselves in this, other nations will outrun us. Paixhans cannon, Minié rifles, Kufahl needle guns, Colt's revolvers, are all the production of foreigners; and we are yet far from having attained all the improvements of which projectiles are capable. Battles in many cases are won by surprises. It is recorded that the externally-fixed bayonet won a battle at its first use by surprising the opposing force with a discharge of bullets, not practicable with the ordinary mode of fixing the weapon. Effective revolving fire-arms give a sixfold advantage to the ordinary pistol; and although it is true that English hearts and courage cannot be permanently depressed by surprises, still a nation loses much of its prestige that borrows all its improved weapons from the stranger. The same motives being given, the qualities that have raised us to pre-eminence in steam-engines and textile machinery and machinery for working metals will raise us to equal prominence in weapons of war. Our English archers of yore could outmatch the world, and so should the bearers of our firelocks yet to come, while our artillery cast projectiles to ranges yet unknown, with means of simple land transit for heavy guns, that can in any emergency convert the wilderness into a road of civilization and dispense with half the beast of draught.

Our Blakes and Drakes and Howards of old swept the seas of foemen in our struggles for onward progress, with imperfect appliances. Our modern steam-moved fortresses, the giant coursers of the ocean, have yet attained but to their mid-growth. Steam, and the chemical agents that will possibly supersede it, have many more tasks to perform than have yet been assigned to them; and for the structure of the vessels machinery is yet required, to change a construction from a state of comparative handicrafty to the unerring work of self-acting tools; and they have yet to be made unsinkable and incombustible,—two things quite within the reach of our existing art.

* * * * * * *

The volume before us, with its description and drawings, should be furnished gratuitously to all mechanics' institutes and reading-rooms, precisely as book-publishers are forced to contribute to the British Museum and similar establishments. If individuals are taxed for the public welfare in the article books, surely there can be no reason why the Commissioners of the Patent Office, after incurring the expense of composition and drawing, should not furnish extra copies, costing mere expense of paper, to public establishments. We trust that the Commissioners of Patents will hold it a part of their duty to see that these new and valuable blue-books do not remain a dead letter, like other blue-books, at the printer's, but that they be really circulated for the public welfare. It should be well understood that the Patent Office is not maintained out of the taxes paid by the general public, but by the taxes levied on inventors in the shape of fees in addition to the stamp-tax they pay. Therefore the public instruction communicated by the free circulation of the published patents would in truth be a boon from the small body of inventors to the public.

DESCRIPTION OF A RAPE-SEED HARVEST IN THE YEAR 1800.

By W. Brotherton.

Rape-seed is the produce of a common English plant, and the rural ceremony of a rape-thrashing, as practised in Yorkshire in the beginning of the present century, was a singular example of the half-work half-holiday system. When twenty or thirty acres of rape were to be thrashed, all the neighbours for miles round came to assist, and the farmer made ample provision of meat and drink for his kindly assistants. Every one who came offered a helping hand, and a few were engaged at stipulated wages, to ensure a sufficient supply of labourers. Before the appointed day, a flat, open place was cleared from stubble and rubbish to form a thrashing-floor, and on this was laid the rape cloths, which were strong heavy cloths, twenty yards square. The men divided themselves into carriers, thrashers, and floor-men, while the women and boys supplied them with the rape plants. Canvas carrying-cloths were provided, about six feet square, with poles fixed on two opposite sides, in the manner of a roller-map, openings being left in the middle, between the poles and the canvas, for the two men to pass their arms through, one on each side the poles. The operations commenced by the boys holding the carrying-cloths open, while the women filled them with the rape plants. The carriers then bore the laden cloths to the thrashing-floor, resting the poles on their shoulders, and allowing the cloth filled with rape to hang betwixt them. The rape was then spread out on the thrashing-cloths, in a circle as large as the cloth would admit, and the thrashers moved continually in this circle, marching with a slow step, in pairs and in two divisions, the individuals of each division following one another as closely as the nature of the employment would allow. The floor-men were subdivided into layers on, turners, takers-off, rake-men, riddlers, &c., each of whom had a prescribed office to fill. The layers-on went first, placing the rape-plants on the ground; then came the first division of thrashers; then the turners to turn over the plants; then the second division of thrashers; then the takers-off, who with wooden forks shook off the straw; lastly, the rake-men gathered the seed into recesses formed within the circle, where the group of fillers and riddlers were employed in separating the seed from the principal part of the pod and short straws, which were beaten off in thrashing, while others put the unwinnowed seed into bags and carried it to the waggon.

Towards the close of the day the straw was collected into large heaps, and what with its almost silvery brightness, the close phalanx of thrashers brandishing their flails, the cloth-men busily engaged in their various employments, the team drawing off the bags of seed, the carriers carrying the plants to the thrashing-floor, and the hilarity observable among the whole,—the scene has been described as being one of the most picturesque which the agricultural districts exhibited.

COLOSSAL MONUMENT TO SHAKSPEARE.

It is a subject of frequent remark by foreigners that there is in this country no monument to Shakspeare. Signor Chardigni has conceived the idea of erecting a gigantic statue of the great dramatist. Russia, he says, boasts her colossal statue of Peter the Great; Italy of Charles Borromeo; Bavaria its gigantic statue, the head of which forms a conspicuous ornament at the Crystal Palace. Why should not England have her great statue, Signor Chardigni proposes that the statue should be a hundred feet high, of cast-iron, formed by a new process, which he has invented.

In the statue it is proposed to have three floors, with a staircase for ascending to the top or head of the monument. These three floors will divide the statue into three rooms, of about 80 feet in circumference and 15 feet each in height, the sides of which the artist proposes should be adorned with bassi-relievi, in cast-iron, representing all the chief scenes of Shakspeare's plays. In the middle of the first floor are to be statues, in cast-iron, of the Queen and Prince Albert.

The third floor of the statue, reaching to the head, will afford a most splendid panoramic view of London, through the apertures for the eyes, which, following the proportions of the rest of the statue, will be more than two feet wide. In addition to the light which will come from the apertures of the eyes, a large quantity of light will be admitted by the top of the head, which is for this purpose intended to be made of glass. In addition to this, the folds of the drapery of the statue will admit a variety of openings, not visible from below, through which light and air may be introduced. It is also proposed it should contain a library of the best editions of Shakspeare's works.

Busts, in cast iron, of contemporaries of Shakspeare, and of those whose names have been worthily associated with his, would be fitting ornaments of the interior.

The statue would stand on a pedestal of stone, in which should be the entrance, through doors of cast-iron, whose panels might be adorned with appropriate bassi-relievi.

It has been suggested that the Regent's-park, or the top of Primrose-hill, are fitting spots for its erection.

Colonial Correspondence.

INTRODUCTION OF SILKWORMS FROM ASSAM INTO MALTA AND ITALY.

The following despatch and enclosures have been received through the Foreign Office:

Valetta, May 17, 1854.

My Lord Duke,—In my despatch dated 2nd February, 1854, I begged your Grace to inform the Society of Arts, Manufactures and Commerce, that through the very laudable efforts of Mr. Piddington, of Calcutta, with the aid of the directors of the Peninsular and Oriental Company (after many failures), I had received sound eggs of the Indian silkworm "Bombyx Cynthia," called by the natives "Eria" or "Arrindy," and which feeds on the leaves of the castor oil plant.

These worms having passed through all their mutations in Malta in a healthy state, a second generation, from eggs laid here, are now hatching daily.

I have also had the satisfaction of learning that cocoons sent from Malta to the Agricultural Society of Turin, have produced moths. Eggs have also been sent to Rome, and I am preparing to send them to other places in Italy, where they have already been asked for.

I am not sure whether the natives of India usually spin the silk of this worm or wind it, although it is said that by a weak solution of alkali they so far dissolve the gum as to be enabled to wind the silk. But we have not yet succeeded in doing so in Malta.

I enclose from a Malta newspaper some account of the periods at which the first brood made their changes, and also from the *Piedmontese Official Gazette*, an account of their progress at Turin, both of which may be interesting to the Society of Arts.

I also send for the Society of Arts a few old cocoons, left by the chrysalides on assuming the state of moths, in the hope that the Society may be able to find some means of dissolving the gum, by which the worm unites the silken threads.

I have, &c.,

(Signed) WILLIAM REID, *Governor*.

His Grace the Duke of Newcastle, K.G.

THE ERIA SILK-WORM OF ASSAM.

(From the *Malta Times.*)

Some time since, our contemporary the *Mail* published the contents of a pamphlet consisting of extracts from the *Journal of the Asiatic Society of Bengal* on the silk-worms of Bengal. The idea of introducing into Malta one of the species, viz: the *Eria*, or *Phalæna Cynthia*, of Assam, was then already started; but it was still a question whether the very first step of the introduction could be successfully accomplished. It is now known that this difficulty has been overcome: that eggs have been brought, worms hatched, fed on the leaves of the castor oil plant, have spun their silk shrouds, and gone through all the processes of their mysterious existence round to the egg again, in a room at the Palace of St. Antonio.

The subjoined memorandum, which we are authorized to publish, states the different stages of this process, the dates and appearances of the changes, and in short all the leading phenomena of the case:—

"Through the laudable efforts of Mr. Piddington, of Calcutta, aided by the directors of the Peninsular and Oriental Steam Company, after many unsuccessful attempts, his Excellency the Governor has succeeded in obtaining sound eggs of the Assam silk-worm, called in that country the Arrindy, Aria or Eria, and by naturalists, the *Bombyx Cynthia* and also *Phalæna Cynthia*. These eggs, which arrived in Malta on the 2nd December, 1853, having been placed under the care of Dr. Frendo, M.D., at St. Antonio, produced upward of 600 worms. The first which were hatched died apparently from cold. But after a fire was kept in the room, and the temperature at between 58° and 68° of Fahrenheit's thermometer, very few died, and latterly none. These worms were fed exclusively on the leaves of the castor-oil plant, the *Ricinus Communis* of botanists.

"On the 18th January some were observed to change their colour, and became of a light yellow.

"On the 13th January they underwent their second change; they then assumed a bluish green colour.

"On the 28th January they commenced to undergo their third change.

"On the 6th February they began the fourth mutation.

"On the 8th February the first cocoon was observed.

"On the 11th March fires in the room were left off.

"On the 16th March the worms were in the state of chrysalis.

"On the 12th April the first moth appeared, and

"On the 17th April they began to lay their eggs.

"By the 7th of the present month the greater part of the moths died, after depositing their eggs, the average duration of their lives having been about 14 days. Twelve cocoons weighed 4 drachms and 25 grains: the average weight of a cocoon according to this is 1-12th of a grain."

We have just been informed (May 9) that some of the eggs are hatched this day.

In addition we republish, extracted from the above pamphlet, all the portion of it relating to the Eria-worm. It may be useful for those interested in the subject to compare the series of phenomena observed in Malta and in India, and to note any differences. It certainly is not unreasonable to anticipate much advantage from the "Eria," should the climate permit the establishment of this stranger among us. The "Palma Chrysti" grows readily in Malta, and it will be seen from the statements of the pamphlet how great is the productive power of the worm, and how useful a manufacture can be derived from its produce, even under the disadvantage of its not being yet "wound off." The last sentence quoted from the pamphlet seems particularly worthy of attention. The Maltese who have made so much of their cotton, will in any case be able to turn to good purpose the durable produce of the "Eria" worm, and should practical chemistry prove to have in store the solution of the problem, how to wind off the silk without breaking, a new and most profitable channel for exertion, will have been opened to the patient and ingenious workers of these Islands.*

SILK CULTURE.

(Translated from the *Piedmontese Official Gazette.*)

At last, after many unsuccessful trials, we have had the good fortune to see the chrysalides hatched in Turin. Our correspondents, persuaded that *will is power*, were not deterred from the task, but by renewed exertions, and successive attempts, have succeeded in their object of importing from Bengal to Turin the precious silkworm of the Indies.

Our colleague Signor S. Giseri, so skilful in the rearing of silkworms, charged especially by the Royal Academy of Agriculture, writes us the following: "The cocoons delivered to us by you on the 19th of March last, were placed in a dark room, where the mean temperature was kept at 20 centigrammes. I began to despair when I saw a month pass without any result; as at an equal temperature the cocoons of our country take only from 12 to 15 days to bring forth the moth. Still the state of the chrysalis was not yet hopeless. The new insects just now come to life are very fine, with large and full wings, of a tawny colour, and having yellow oblong spots. I have already two pairs which came forth two days since, and three males, which came forth yesterday, and am impatiently waiting for the appearance of their mates The delay above mentioned was, to say so, providential, as the nourishment of the future worms was not yet ready: the young plants of the Ricinus (Palma Chrysti) being only as yet furnished with their hard primitive shoots, although we had planted the seeds during the previous winter. I trust now we shall be able to rear up this new insect, which with so much anxiety, perseverance, and outlay, has been brought over alive to Piedmont."

In the meanwhile we have received the intelligence that the Governor of Malta has successfully brought up a brood of them at Valetta.

Sir W. Reid informed us in his last, that he hoped to overcome the difficulties of unwinding the silk from the new worms, by using water slightly alkaline, and, what is perhaps better, water with a small quantity of *soap*, as the soda might perchance weaken the silk, and also injure its spinning quality.

His excellency Sir James Hudson, the English Minister in Turin, assures us, that when at Rio Janeiro, two years ago, he heard that a Lombard had come there for the purpose of attempting, on a large scale, the rearing of the Palma Chrysti worm, as both this insect and the Palma Chrysti thrive well in Brazil.

Mr. Piddington writes us from Calcutta, on the 17th of March last:—"I have read with pleasure the various notices of the Bombyx Cynthia inserted in the *Official Gazette* of Turin. I know that these silkworms thrive at Malta, although they have been somewhat affected by the cold. I have written to our common friend, the Governor of Malta, to inform him that the temperature of Assam varied from between 57 and 40 Fahrenheit, the temperature being 68 F, (20 centigrade, 16 R.), and that the north and north-east winds blowing there are very cold. The seed I have forwarded to him came from Bogorah (?), half-way between Calcutta and Assam, where the cold is very intense. There is a great quantity of ice in the winter in the plains at Hoogly, distant about 25 miles north of Calcutta, by reason of the evaporation of water in porous and shallow pans. I have also brought up in the winter many of those silkworks (*une couvée de vers*), which I had not hitherto attempted, and I have seen many perish in the early stages of their existence, the formation of the cocoons retarded, and every insect beginning to spin whilst still

* The matter referred to by the editor of the *Malta Times* has already been published in the Society's Journal. It will be found in the number for March 3rd of the present year, p. 263.

very small. In this we must admire one of the laws of Providence, to which every animal, and especially such prolific insects, must conform, namely, that there are seasons in which, owing to the atmospheric changes, and for want of sufficient nourishment, the insects die in great quantities. Were it not so, the world would not be large enough to contain them. I also warned Sir Wm. Reid that perhaps our rooms are too light for these insects, the light being injurious to their eggs, as it is to the germination of plants. In its natural state, the Bombyx Cynthia lives under the shade of green foliage, a very scanty light penetrating into the miserable huts of our ryots (peasants of Bengal). It is also believed that too much light is injurious to the production of silk. I give you a hint of these ideas, without commenting on them, being persuaded that you will exert yourself in every way for the successful rearing of these valuable insects. Lastly let us bear in mind, that these poor little animals are the first of their kind which have crossed the ocean, and been installed in the splendid palaces of the Knights of Malta, and that if you have an idea of presenting them at Court "je ne reponds pas des suites."

Our spirited Mr. Piddington finishes by begging us to send his kind compliments to Signor F. Berzonzi, at Boulogne-sur Mer, to whom we owe the first idea of the attempt to enrich Italy, if possible, with the new silkworm of the Indies.

The problem, then, for the naturalist seems solved. This insect can be transported to, and successfully reared in, latitudes differing so widely from those of Turin and Assam in Bengal. The common Recinus (Palma Chrysti), especial food of the Cynthia, takes well in Piedmont; and already the production of the seeds more than pays the cost of cultivation. In the Province of Nice, in the Island of Sardinia, and in the other more southern countries of Italy, the Ricinus grows luxuriantly. The silk-growers will now try how far it will answer to couple the rearing of the silkworm of India with that of China. The first yields in its native land seven crops of cocoons in the year, and supplies us with a finer and more beautiful silk. Naturalists and silk-growers will soon have the opportunity of trying a mixture of the two breeds; meanwhile, the experiments now made give every man to expect that the most sanguine hopes of those interested in the cultivation of silk will ultimately be realized. Let us close these few lines addressed to our numerous correspondents with the observation recently made by the celebrated naturalist, Geoffroy de St. Hilaire, President of the Paris Society of Zoological Acclimatation: "The number of the species of animals generally reckoned by the modern naturalists exceeds 140,000, the greatest part of which will be perhaps always useless to man; whilst up to the present time we have not been able to domesticate more than 43 species." How much, then, remains to be done, and why, for instance, should we not follow the example of the Canary Islands, which have already more than doubled the value of their rural products by the easy cultivation of cochineal, and attempt to introduce at once this valuable insect into the Province of Nice, or, at least, into the Island of Sardinia, where the *Cactry spantia* thrives in abundance.

G. F. BARUFT.

Turin, April 29th, 1854.

Home Correspondence.

LITERARY AND SCIENTIFIC INSTITUTIONS BILL.

Sir,—Having been favoured with a copy of the bill prepared by the Council of the Society of Arts, and introduced into the House of Commons by Mr. Hutt and Mr. Headlam, I read its provisions with very great satisfaction. But, unless I am greatly deceived, these provisions, so calculated to serve all the existing Institutes in the country, and those which may in future times be established, do not extend to Ireland. If such be the case, the regret which I felt at being absent from the Conference will be increased, as I am certain the feeling of so respectable a body would be in favour of extending every aid to those who are supporting or forming Literary and Scientific Institutions in Ireland.

I may, therefore, hope that the Council of the Society will give some consideration to the suggestion I have now the honour to make,—that the bill be extended to Ireland as well as to England and Scotland. Our institutions may not be as numerous, but they are as much wanted in this as in any portion of the empire. All the evils sought to be remedied by the provisions of the bill have been felt here—the want of responsible governing bodies—the inability to punish members for injuring or appropriating the property of their fellow-members, &c. It is, therefore, not too much to hope, that this Act of Parliament may embrace Ireland as well as any portion of her Majesty's dominions.

If I am right in the calculations I have made, there are over 48 literary, scientific, and mechanics' institutes in Ireland, with an average membership of 150 members. Any effort to give stability to these institutions—to aid them in their extension, or encourage those who have laboured to establish and maintain them—is certain to command the sympathy and support of the Society of Arts, and every lover of those blessings which follow in the train of improved industrial and scientific knowledge. In this spirit I venture to bring this matter under the consideration of the Society,

And I have the honour to be, Sir,

Your very obedient servant,

W. L. JOYNT,

President Limerick Literary and Scientific Society.

Limerick, 82, George-street, July 6th, 1854.

EXTINGUISHMENT OF FIRE ON SHIPBOARD.

July 3rd, 1854.

Sir,—The late lamentable conflagration of the *Europa* has called to mind official "suggestions" of so long ago as the year 1796—they were the keeping in constant readiness to be used the pumps and apparatus provided for the extinguishment of fire on board ship—a precaution too often fatally lost sight of. A copy of these "suggestions" is annexed to this communication. It may be observed that, although sea-going vessels are now frequently provided with force-pumps, neither they nor their hose are made subservient to the many services for which they might be employed, and, consequently, when wanted for the extinguishment of fire, some part or other of the apparatus is found to be out of order, or the hose is mouldy and bursts, or the people are aykward in its use.

The uses indicated by Sir Samuel Bentham are not the only ones to which on board ship fire-extinguishing apparatus is applicable, and it seems evident that the more frequently it is employed the more likely it is to be kept in a good working state.

The copy of a letter to the Secretary of the Admiralty requesting him to lay the above-mentioned "suggestions" before the present Lords Commissioners of the Admiralty.

M. S. BENTHAM.

(Copy.)

July 1st, 1854.

Sir,—In the orders issued by Sir Charles Napier, a copy of which was given in the *Times* of this morning, it appears that articles 13 and 18 make certain provisions for the extinguishment of fire on board ship in time of action, but none for the *frequent use* of the apparatus in question. I would, therefore, take the liberty of requesting you to lay before the Lords Commissioners of the Admiralty the "suggestions" submitted to the Admiralty by the In-

spector-General of Naval Works, on the 20th December, 1796.

These "suggestions" indicate various services for which force-pumps were applicable on board ship, and recommended their use for several purposes, whereby the pumps themselves and their appendages would be kept in good order, and a ship's crew habituated to their use. It must be added, that destructive conflagrations on board ship, no less than on shore, are but too frequently the consequence of want of readiness for use of fire-extinguishing apparatus, and of ignorance of the means of its application.

I am, Sir,
Your very obedient Servant,
M. S. BENTHAM.

Bernal Osborne, Esq., M.P.,
Admiralty.

Suggestions respecting the various uses to which an apparatus for raising water by means of a forcing pump is applicable on board ship, submitted for their lordships' consideration, and upon which some decision is requested for the purpose of establishing the services to which apparatus of this kind should be adapted.

1st. With respect to the important purpose of extinguishing fire, it is conceived that the whole apparatus to be used in cases of such emergency, should, as far as possible, be no other than what is in daily use for ordinary purposes.

2nd. It appears desirable, at the time of preparing for action, to have an easy mode of wetting sails, rigging, decks, upper works, and, in general, all parts of the ship where wetting would not be injurious.

3rd. It appears from theory that the wetting the sails of a ship should increase the advantageous action of the wind upon them, not only by closing up the interstices between the threads of which they are composed, but likewise by making the sails stand flatter. The custom of wetting the sails on board small vessels, the only ones where the expedient is at present practicable, seems to confirm the idea of its supposed utility.

It is customary to have a cask of water on the tops of ships in time of action, ready for a quantity to be thrown, by means of ladles or scoops, upon sails or cordage on fire. A small kind of fire engine, by affording means of throwing the water with more certainty as well as to a greater distance, would enable a small quantity of water to be made more serviceable.

Should it be thought expedient to wet the sails for the purpose of increasing the advantageous effect of the wind, it would be from the tops, by means of a forcing engine, that this business could be best done, and hereby the apparatus prepared for this purpose would be one that would be kept always in good order, and, therefore, in readiness for the extinguishing fire during action or otherwise.

Should the wetting the sails and rigging be on any account thought necessary, the uses to which an apparatus for raising clean sea-water on board ship might be applied would then be as follows:—

1st. The forcing the water in hoses or pipes to the tops, to supply the engines fixed there.

2nd. To distribute water in large quantities to any part of the interior of a ship, and particularly to the magazine, in case of fire.

3rd. By the addition of the engine-pipe to the end of the hose, the throwing water to any height not exceeding that of the main-top, for the purpose of wetting the lower sails and rigging.

4th. To drive the water with some degree of force, and in large quantities, upon the decks to wash them, instead of using buckets for that purpose.

5th. For the supplying the salt water used in cooking, distilling, and washing of all kinds.

For each of these five purposes, the pump itself could at any rate be used, and therefore no danger of its remaining out of order by neglect. For the first three purposes the hose would be necessarily used; for the fourth and fifth it might likewise be ordered to be used.

Should the practice of wetting sails be established, that alone might afford security for a fire-extinguishing apparatus being always in order. If there should be objections which I am not aware of to the wetting the sails, it would then become necessary to find some other constant use for the hoses provided against cases of danger, and it would then appear worth while, on this account, to enforce by the strictest orders the employing these hoses at all times for washing the decks and upper-works: the means thus afforded of dashing the water with force into crannies and corners could not but facilitate this business when the men became a little used to it. The little difficulty arising from the unwieldiness of so long a hose, the precaution necessary in moving it about to avoid twisting and entangling it, so likewise the inconvenience and discomfort arising from any leaks in the hose, would altogether ensure the management of the hose being well understood, and its being kept in the best working condition, ready to be employed when called for in the important service for which it was chiefly designed.

(Signed) S. BENTHAM.

Portsmouth, Dec. 20, 1796.

SCHOOLMASTERS AND THE EDUCATIONAL EXHIBITION.

Sir,—A short time prior to the opening of the Educational Exhibition I wrote to the Finance Committee, suggesting the great importance of every teacher visiting it, because it is to them that the country will have to look for any practical results that may be derived from it; and I further suggested that, in consequence of the distance which some teachers were necessarily placed from London, and the small salaries which a large proportion were receiving, it would be impossible for them to pay that visit, unless the directors of the various railways would, in this special instance, meet their particular case by lowering the fares to and from London, or some other means be adopted to send them comparatively free of cost.

The Society of Arts has done all that was expected from them; the suggestions have been strengthened by their influence and promulgated to the world, not only through the columns of its Journal, but by some of the leading papers of the country; but it is because I have heard of only one instance where the recommendation has been acted upon, that induces me now to trouble you with these few remarks.

It is perfectly true that "what is every one's business is nobody's," and without organization, or some one taking the initiative, all schemes, however laudable, die away. In order, therefore, to give your recommendation a more practical bearing, I respectfully suggest that the secretary of each public school should, as soon as possible, call a meeting of the committee, subscribers, and friends of his particular school, in order that the objects of the Exhibition might be stated, and the benefits that would result to society from the teacher's visit to it.

I am strongly of opinion, if this course were generally adopted, that not only would a very large number of teachers profit by visiting the Exhibition, but that the cause of education would receive such an impetus as it has not had for some time; and, more especially, if the teacher were required to prepare a paper, to be read to the meeting, when convenient, after his return, upon the more important ideas which suggested themselves to his own mind, and the best means of practically embodying them in his own neighbourhood. This, I think, would be nothing more than was due to the kindness of those who sent him, as well as more fully securing the object contemplated.

Before concluding these remarks, I would respectfully suggest, if possible, that the names and localities of all schools whose teachers are sent to the Exhibition by

their committees, be published, as they occur, in your Journal.

The number of such insertions, by being a practical proof of a desire to improve the education given, will be the best test of the cry that is now being raised, viz., that it is the *quality* and not the quantity of education that is wanting.

I am, Sir, your very obedient servant,
JOHN HILL.

Proceedings of Institutions.

PIMLICO.—A meeting was held at St. Peter's Collegiate School, Eaton-square, on the 24th ult., on behalf of the Pimlico Literary, Scientific, and Mechanics' Institution. The Right Hon. Henry Labouchere, M.P., who presided, in opening the proceedings, remarked that, with the view of giving to the Institution those elements without which success could not be attained, they had incurred a debt of £210, which it was exceedingly desirable to have cleared off. The Right Hon. Sir John Pakington, M.P., moved the first resolution, which was as follows:—"That, considering the number of inhabitants in Pimlico to whom a Literary, Scientific, and Mechanics' Institution is calculated to afford important advantages, it is desirable, in the opinion of this Meeting, that such an Institution should be maintained in its locality." The resolution, having been seconded by the Rev. J. H. Hamilton, the President, was unanimously carried. The Right Hon. Joseph Napier, M.P., then rose to propose the following resolution, which he said was self-explaining:—"That, while it is expedient to keep the terms of admission as low as possible, the unavoidable expenses of such Institutions in the Metropolis are so great as to render the cooperation of the higher classes essential to their support: That a subscription be therefore entered into for the purpose of liquidating the debt incurred in the enlargement of the Institution, and that the resident nobility and gentry be solicited to become honorary and life Members." Mr. Edward Ryde, at the request of his colleagues of the Committee, seconded the resolution, which was carried. Thanks were then given to the trustees of the school, and to the Chairman for his conduct in the chair. Previous to the dissolution of the meeting, the Honorary Secretary announced that subscriptions amounting to about £110 had then been received, and eight additional annual subscribers.

MEETINGS FOR THE ENSUING WEEK.

MON. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Mr. A. Henfrey, "On the Relation of the Science of Botany to other Branches of Knowledge." No. 3 of a Series.
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Rev. F. French, "On Good and Bad Delivery in Reading."

WED. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Mr. Horace Grant, "On Writing."
Royal Botanic, 3½.—Promenade.

THURS. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Professor Rymer Jones, "On Modern Discoveries by the Microscope."

FRI. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Mr. Williamson, "On the Relation of Chemistry and Physics to other Branches of Knowledge." No. 2 of a Series.
Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Dr. Carpenter.

SAT. Royal Botanic, 3½.
Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Mr. T. Huxley, "On the Relations of Physiological Science to other Branches of Knowledge." No. 4 of a Series.

To Correspondents.

ERRATA.—In the last Number, at page 578, Mr. Geo. G. French (Poole *Mechanics' Institute*) is reported to have asked a question during the discussion on the "Literary and Scientific Institutions Bill." The question was put by Mr. W. H. Reveley, the Representative of the Poole *Literary Institute*.—Page 578, column 2. the paragraph at the end of the sub-heading "Power of Borrowing," commencing with "After some. &c.," and ending with "clearly defined," was inserted in error, the resolution having been withdrawn.

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 29th June, 1854.

Par. Numb.
314. Complaint (7th February)—Report (a Corrected Copy).
322. Sheriffs (Scotland)—Return.
328. Flax and Hemp, &c.—Returns.
154. Bills—Merchant Shipping (as amended in Committee and on Re-commitment).
160. Bill—Vaccination Act Amendment.
Public General Acts—Cap. 20, 21, 22, 23, 24, and 25.

Delivered on 30th June, 1854.

312. River Tyne—Copies of Instructions, &c.
332. Parratt's Tubular Life Raft—Report.
155. Bills—Reformatory Schools (Scotland) as amended in Committee and on Re-commitment).
162. Bills—Episcopal and Capitular Estates Management.

Delivered on 1st and 3rd July, 1854.

299. Trading and other Companies (Application for Grants of Charters)—Return.
333. Stokesley Union—Correspondence.
57 (5). Trade and Navigation—Accounts.
164. Bills—Usury Laws Repeal.
165. Bills—Letters Patent for Inventions.
166. Bills—Witnesses (Lords' Amendments).
167. Bills—Bribery, &c., (as amended by the Select Committee).
Factories—Reports of the Inspectors.
Poor-Law Board—Sixth Annual Report.
Convict Discipline and Transportation (Australian Colonies)—Further Correspondence.
New York Industrial Exhibition—Special Report of Sir C. Lyell.
Eastern Papers (Additional Article to the Treaty of April 20, 1854, between Austria and Prussia). Part 10.

Delivered on 4th July, 1854.

311. County and Borough Lunatic Asylums—Abstracts of Accounts.
327. Newspapers—Return.
340. Bribery &c. Bill—Proceedings of the Select Committee.
163. Bills—Registration of Births, &c. (Scotland) (as amended in Committee and on re-commitment).
169. Legislative Council (Canada).
170. Bills—Borough Rates.
171. Militia.

Delivered on 5th July, 1854.

329. Poor Relief (Strath), Poor Law (Strath)—Papers.
334. Lead and Lead Ore—Account.
336. Berthorn's Collapsing Life Boat—Copy of Report.
341. Income Tax—Return.
314. Convict Prisons, &c. (Ireland)—Correspondence.
161. Bill—Jurors and Juries (Ireland) (amended).

Delivered on 6th July, 1854.

134. Shipping—Returns (a corrected leaf).
347. Treaty of Adrianople—Dispatch from the Earl of Aberdeen to Lord Heytesbury.
331. Museum of Industry (Dublin)—Return.
172. Bills—Commons Inclosure (No. 2).
174. Bills—Registration of Bills of Sale (Ireland).
175. Bills—Savings Banks.
176. Bills—Valuation of Lands (Scotland) as amended in Committee on Re-commitment, and on Second, Third, and Fourth Re-commitments.
177. Bills—Married Women (amended).
British Fisheries—Report of the Commissioners.
Inclosure Commission—Special Report.

Delivered on 7th July, 1854.

168. Bills—Merchant Shipping Acts Repeal (amended).
178. Bills—Literary and Scientific Institutions (amended).
179. Bills—Judgment, Execution, &c. (as amended by the Select Committee, and in Committee).

Delivered on 8th and 10th, July, 1854.

351. Mr. H. B. Swabey—Copy of Report.
330. Royal Dublin Society—Abstract of Return.
335. Westminster Bridge—Correspondence, &c.
338. Dublin Hospitals—Report from the Committee.
343. Burial Grounds (London)—Return.
348. Medical Relief—Report from the Committee.
352. Education—Minute by the Committee of Council.
180. Bills—Jury Trial (Scotland).
181. Bills—Standard of Gold and Silver Wares.
182. Bills—Friendly Societies (No. 2).
184. Bills—Joint Stock Banks (Scotland).
185. Bills—Cinque Ports.
186. Bills—Incumbered Estates (West Indies).
183. Bills—Criminal Justice (Metropolis).
188. Bills—Poor Law Commission Continuance (Ireland).
190. Bills—Highway Rates.
191. Bills—Heritable Securities (Scotland).

193. Bills—Turnpike Trusts Arrangements.
194. Bills—Turnpike Acts Continuance, &c.
Servia (Occupation by Austrian Troops)—Memorandum.
Salisbury and Yeovil Railway Bill—Minutes of Evidence.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 7th*, 1854.]

Dated 19th June, 1854.

1332. J. V. Weber, Orchard street, St. Luke's—Chronometers.

Dated 21st June, 1854.

1355. W. Donald and W. Higinbotham—Looms.
1357. H. V. Physick, 38, North bank, Regent's park—Electric telegraphs.
1359. O. R. Chase, 17, Cornhill—Manufacturing lozenges.
1361. W. E. Newton, 66, Chancery lane—Generating and utilizing steam. (A communication.)
1363. W. Stableford, Bromsgrove Railway Carriage Works—Railway breaks.
1365. J. F. Heather, M.A., Woolwich—Flow of gas.

Dated 22nd June, 1854.

1367. T. C. Yates, Bolton le Moors—Wickets for cricket.
1369. J. M. Blashfield, Millwall—China, pottery, bricks, &c.
1371. C. Cowper, 20, Southampton buildings—Combing fibrous substances. (A communication.)
1373. E. Smith, Carlisle street—Watch key.
1375. G. F. Logan, Glasgow—Portable winches.
1377. A. P. Price, Margate—Tin.
1379. J. Farrell, Dublin—Fireproof buildings.

Dated 23rd June, 1854.

1382. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Nails. (A communication.)
1384. S. Dreyfus-Werth and P. Meunier, of Ste. Marie-aux-Mines (Haut-Rhin)—Designs to fabrics and other materials.
1386. T. Rudd, Pimlico—Stands for casks.
1390. W. E. Osborn, Milton, U.S.—Breech-loading guns or cannon.
1392. R. M. Letchford, Whitechapel—Match stand and holder.

Dated 24th June, 1854.

1394. T. Skelton, Plaistow—Tillers or yokes.
1396. D. L. Williams, Cannon street, and J. W. Neale, Stepney—Furnaces.
1398. J. Davies, Bristol—Propelling vessels.
1400. J. Kenworthy and T. Rigby, Preston—Water closets.
1402. J. Revell, Newark—Horseshoes.

Dated 26th June, 1854.

1404. A. Bain, 4, Queen's row, Grove lane, Camberwell—Fire-arms.
1406. J. Brown, Haddington—Metal spouts or troughs.
1408. C. Beale and J. Latchmore, Leicester—Knitted shirts.
1410. W. Yates, Bromley—Furnaces.

Dated 27th June, 1854.

1412. A. Smith, Princes street—Wire ropes, &c.
1416. W. Morgan, Birmingham—Machines for cutting materials for paper making.
1418. W. Coltman, Leicester—Knitting frames.

Dated 28th June, 1854.

1420. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Axle boxes. (A communication.)
1422. H. S. Edwards, Cranbourne street—Preparing textile fabrics for retaining colours. (A communication.)
1424. J. Morison, Paisley—Ornamental fabrics.
1426. J. G. Jones, Liverpool—Teaching addition.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1458. A. S. Stocker, Hall street, City road—Match boxes, and the fitting, stoppering, and covering of tubes and other vessels of glass, porcelain, &c. July 4th, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed July 7th, 1854.

48. Richard Husband, of Manchester—Improvements in the method of ventilating hats or other coverings for the head.
52. Edward Tyer, of No. 3, Rhodes terrace, Queen's road, Dalston—Improvements in giving signals on railways by electricity, and in instruments and apparatus connected therewith.
140. Oliver Rice Chase, of Boston, U.S.—Pulverising machinery.
174. Adderley Willcocks Sleigh, of No. 1, Weymouth street, Portland place—Creating a continual self-acting self-sustaining new motive power applicable to every purpose requiring speed, motion, and power together or separately.
190. Archibald Lockhart Reid, of Glasgow—Improvements in printing textile fabrics and other surfaces.
192. Thomas Wicksteed, of Leicester—Improvements in the manufacture of sewage manure.
201. Patrick Moir Crane, of 18, Canonbury villas, New North road—Improvement in the manufacture of iron.
240. William Wright and George Brown, of Newcastle upon Tyne—Improvements in cupolas, which improvements are also applicable to smelting and other furnaces.
456. Auguste Edouard Loradoux Bellford, of 16, Castle street, Holborn—Improvements in turntables for railways.
852. John Miller, jun., and Michael Burke, both of Liverpool. Improvements in machinery for transmitting motive power.
974. Walter Macfarlane, of Glasgow—Improvements in water-closets, lavatories, dust bins, and public and domestic conveniences.
992. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in lathes for turning wood and other materials. (A communication.)
1022. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in the construction of railway carriages. (A communication.)
1034. Francis Peter Berquez, of Richmond road, Dalston—Improvements in gas cooking and heating stoves, and in generating heat therefore.
1037. Alfred Vincent Newton, of 66, Chancery lane—Improvements in the manufacture of artificial stone for building and other purposes.
1038. Eben Norton Horsford, of the state of Massachusetts, U.S.—The removal of chlorine from substances and fabrics.

Sealed July 11th, 1854.

89. Patrick O'Malley, of Dublin—The manufacture of a new drink or beverage from certain vegetable and other substances, and the conversion thereof into vinegar.
96. Charles Frederick Stansbury, of No. 17, Cornhill—Improved mode of propelling machinery.
98. James Newall, of Bury—Improvements in machinery or apparatus for stopping or retarding the progress of railway and other carriages, and in the mode or method of connecting two or more carriages with the said apparatus together.
144. Richard Roberts, of Manchester—Improvements in machinery for cutting paper, pasteboard, leather, cloth, and other materials.
261. Adolphe Mohler, of Obernay, (Bas Rhin)—Improvements in apparatus for lubricating machinery.
267. Peter Armand le Comte de Fontaine Moreau, of 4, South street, Finsbury—Improvements in the construction of buildings.
300. Alphonse François Damien Duvillier, of Rue du Bouloi, Paris—New system of remontoirs or apparatus for winding up watches without a key.
305. Barthelemy Urbain Bianchi, of Paris—Improvements in preventing accidents on railways.
1331. James Mitchell, of Dykehead, N.B.—Improvements in forcing or distributing liquids.
355. Louis Faure, of Paris—Improvements in the process for manufacturing iodine.
438. William Hunt, of Lea Brook Chemical Works, near Wednesbury—Improvements applicable to the utilizing of ammonia given off in certain manufacturing processes.
715. John Roberts, M.D., of Bruton street, Bond street—Improvements in the construction of cabriolets.
817. John Robert Johnson, of Stanbrook cottage, Hammersmith—Improvements in the manufacture of type and other raised surfaces for printing.
1053. Alfred Vincent Newton, of 66, Chancery lane—Improvement in the construction of carriage wheels and in the mode of mounting them on their axles.
1105. John Beads, of Pendleton—Improvements in machinery or apparatus for preparing, spinning, doubling, and twisting cotton, woollen, silk, linen, or other yarns.
1111. John Maclean, junior, and Thomas Finlayson, both of Glasgow—Improvements in the manufacture or production of ornamental fabrics.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
July 7.	3611	A Self-acting Stopper, suitable for Ships' Cables, to be fixed either before or abaft the Windlass	James C. Hall	Monk Wearmouth, Durham.
"	3612	Improved Steering Apparatus (the wheel placed either horizontal or vertical), suitable for Ships of large and small sizes (horizontal for large, and vertical for small Ships.)	James C. Hall	Monk Wearmouth, Durham.
" 8.	3613	Railway Buffer	Joseph Wright and Sons ...	Saltby Works, near Birmingham.
"	3614	A Hot-water Warming Pan	William Young	33 & 34, Queen street, Cheapside.
"	3615	A Reversible Neck Tie	Thomas Toms	56, Aldermanbury.

Journal of the Society of Arts.

FRIDAY, JULY 21, 1854.

MEETING OF COUNCIL.

WEDNESDAY, JULY 19, 1854.

The following Institutions have been taken into Union since the last announcement:—

364. Blackburn, Bank Foundry and Highfield Mill Athenæum.
365. Kingston-on-Thames, Mechanics', Literary and Scientific Institution.

LIST OF LECTURERS.

In accordance with a resolution which was passed at the Conference of the Representatives of Institutions on Tuesday, the 4th inst., requesting the Council to revise and publish a new edition of the List of Lecturers as soon as possible—circulars and forms have been issued to all the Institutions in Union, with a view of obtaining from each its quota of experience.

The first List, it will be remembered, was formed *exclusively* from returns made by the Institutions themselves; and the Council proposes to adopt the same plan in the present instance. It was remarked by some of the speakers at the Conference that the list contained the names of but few gratuitous Lecturers, and it was thought that considerable additions might be made in this direction with advantage.

The Institutions must distinctly understand that the value of the list depends entirely upon themselves—upon the care and fidelity with which the several recommendations are made.

The returns should be received from the Institutions not later than the 24th inst., as it is positively intended to publish the list at the end of the present month.

PARIS EXHIBITION OF 1855.

The arrangements on the part of the United States of America in respect of this Exhibition, have been entrusted to the Smithsonian Institution, there being constitutional difficulties in the way of the government acting directly.

The Department of Science and Art announces that forty prizes, of the value of £8, are to be awarded to those students who take medals in the greatest number of stages in each of the Exhibitions. Twenty prizes to be awarded in the autumn Examination of 1854, and twenty prizes in the spring Exhibition of 1855. These prizes are to enable the most deserving students to visit the Paris Universal Exhibition of 1855, and each student will be required to make a written report of his observations on that Exhibition. They will be awarded among the students of all the schools of Art throughout the kingdom.

Educational Exhibition.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £1010, including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

TENTH LIST.

	£.	s.	d.
Thomas De la Rue	5	5	0
W. Lindley, C.E.	2	2	0
Lieut. Col. Sykes, F.R.S.	2	0	0
J. White	1	0	0

ABSTRACTS OF LECTURES, PAPERS, AND DISCUSSIONS.

THURSDAY, JULY 13th, at 3 p.m.

ON THE WARMING AND VENTILATING OF SCHOOLS. BY NEIL ARNOTT, M.D., F.R.S.

The lecturer began by remarking that it would be difficult to overrate the importance to this and all countries which have a cold winter season, of the arts of warming and ventilating, but that as yet, although scientific men judge correctly in regard to them, the mass of the people nowhere suspect the true magnitude of the evils springing from the existing defects. The public may be shocked occasionally by hearing of multitudes perishing from jail or ship fevers, or cholera, generated in confined air, and may observe the temporary illness of persons who have been in crowded and ill-ventilated churches, concert rooms, theatres, &c., but the more permanent injury to health, the early mortality and the diminished enjoyment of life suffered by large classes who occupy ill-ventilated dwellings, manufactories, or schoolrooms, escape common notice. A century ago men did not suspect the possibility of there ever being on earth such steam-engines as we now possess, or railways, steam-ships, gas-lights, penny postage, &c., all of which are the recent fruits of human ingenuity, and chiefly of the ingenuity of men in this country, but now, when all have perceived the extraordinary benefits obtained, and the evils avoided by these novelties, they would deem the world much less worth living in if such things did not exist; so the time is probably not far distant when in public estimation the sanitary arts of which we are to speak to-day will be regarded as things of high value.

The lecturer then observed that nature warms by the sun, and is always ventilating, that is to say, removing from about persons the air rendered poisonous by their breathing, or otherwise, through the agency of wind, and of the warmth given to the breathed air; this warmth, by causing dilatation of that air, or greater lightness under the same bulk, produces a movement upwards, and of the foul warm air departure, urged by the pressure of the surrounding heavier pure air taking its place.

Art imitates nature closely. It warms by fire, and it ventilates by using partly the natural agencies of the wind and the lightness of warmed breath, but also by using the strong upward movement in chimney flues of the hot air which has fed combustion below and is called smoke. This air, by being made to fill the chimney flue as a light column, is pressed up by the surrounding heavier atmosphere with force proportioned to the difference of specific gravity and the height of the chimney. A heated chimney with an open fire-place is, therefore, constantly changing the air in the bottom of the room.

The lecturer then referred to the new arrangement of the open fire-place described in a paper read by him two months ago in the Hall of the Society of Arts, and which was favourably received by the scientific men there assembled. He briefly recapitulated and explained, by diagram, the chief peculiarities of that fire-place—1st, Its being smokeless; 2nd, Its saving much fuel; 3rd, Its having much stronger ventilating force than other open fires, and, 4th, Its taking away the foul air collected near the ceiling of the room instead of the purer air from below. He gave his opinion that this fire-place having the dimensions of its parts and adjuncts adjusted to the purpose in view, will be found to be the best simple means of warming and ventilating schoolrooms.

The modifications required for a school are—

1. The chimney ventilating valve to be larger.
2. The chimney-flue also from above the valve to be larger than below.
3. The chimney top to be surmounted by a moving cowl, or one of the fixed wind-guards, of kindred nature, which, when the wind blows, produce a degree of pumping action.
4. The large quantity of fresh air required for a schoolroom to be caused to enter in a distributed manner, or at various inlets besides the principal one near the fire—as from apertures in a tube placed near the cornice, or across the ceiling—or in summer by the tops of the windows opened a little on the side towards the wind, or by openings near the floor; all considerable openings on the leeward side being closed.

He remarked with respect to larger schools, that—

1. It may be necessary in winter to warm the air which enters at a distance from the fire, by letting it touch the surface of tubes or flat vessels of metal, filled with water, circulating from a boiler at the fire.
2. It may be expedient to use, "at certain times of no wind and medium temperatures," the cheap ventilating pump, with light curtain valves, which has been adopted advantageously in passenger and convict ships. This pump injects or extracts any desired quantity of air with mechanical certainty, and is worked as easily as the bellows of a church organ.
3. It may be desirable to economise fuel by using the more complex pumping apparatus (already proved, but not yet publicly exhibited), which causes the vitiated hot air in passing away from any crowd to give up its warmth to the pure air entering.

He then spoke of some other means of ventilating which are useful for particular cases, and under certain circumstances; but which, by unskilful persons, are often deemed universally applicable, and so are often employed amiss—

1. *Open windows.*—Often allowable in summer—in winter dangerous if more than a chink at the top be opened. A thin sheet of cold air entering the room aloft, will in descending so mingle with the hot air of the room as not to be felt by persons below.

2. *Perforated or opening window panes, or openings in the wall.*—The same remarks apply to these as to the window opened. Such openings produce strong cold currents, where there is an open fire, and foul air does not pass out by them.

3. *The windsail of ships.*—A capacious tube of canvas suspended from the rigging, and leading to the spaces between the decks; the mouth, expanded by a hoop, or otherwise, is kept turned to the wind. This acts powerfully in strong winds, but in calms not at all.

4. A wooden or metallic tube or shaft leading from the open air into a room, and surmounted by a moveable cowl or hood, of which the mouth always turns to the wind, by the action of the wind itself.—This may be regarded as a self-adjusting windsail of inflexible material.

5. Two such tubes opening into the same room or cabin—the mouth of one of the cowls being always towards the wind, to receive fresh air; the mouth of the other being turned away from the wind, to let used air escape. The two together act with double force.

6. Mines are commonly ventilated by two shafts, one having a fire at the bottom, to render it the ascending air shaft; the other, without fire, lets fresh air descend. If there were no fire, the ventilating action would be, in many cases, so imperfect that workers would not be safe below.

7. In some mines a single large shaft is made to answer the purposes of two smaller. It is divided into two channels by a partition, called a brattice, made of iron plate or other fit material, and running down from the top to the bottom. One of the channels serves as the smoke-flue. This arrangement is objectionable on several accounts.

8. In imitation of this, a single short tube of metal, divided by a brattice or partition of metal into two channels, has been fixed through the ceiling of rooms, stables, &c., to ventilate them. It is much better than an open pane in the window, or a hole in the wall—and either of these is much better than no ventilation at all; but it has many faults. It has no source of heat immediately in one channel, like the mine-shaft, to make it draw strongly. The most impure air approaching the opening to pass out is always rubbing against, and mingling in a degree with the new air passing in. It injects and extracts much less strongly than the twin tubes described above at No. 5. When there is little wind, and little difference of temperature in the two channels, there is little or no action. With closed doors and windows in the rooms below, and a strong fire, both channels become inlets of cold air. The cold air entering by it is not diffused in the room, and may prove hurtful, like that from an open window. Yet, with all these defects, it will, in certain cases, prove a useful aid, because it is a high opening to the external air, and has tranquil action. The model containing one or more burning candles, to represent men, which has been used to illustrate its action, is calculated to give to ordinary observers a very fallacious notion of its nature and power.

This being a conversational meeting,

Mr. Barnard, Superintendent of Common Schools in Connecticut, in reply to a call from the chairman, observed. Much attention is now given to the architecture of schools in the United States, and particularly to the best mode—at once cheap, simple, and efficient—of warming and ventilating schools and class-rooms. We aim to provide for the constant flow out of the room of the air which is becoming vitiated by respiration, combustion, and other causes, and the introduction and diffusion of a constant and abundant supply of pure air in the right condition as to temperature and moisture—independent of doors and windows, and, to some extent, of the attention of the teacher or janitor. For this purpose, a flue for ventilation is constructed, large, smooth on the inside, tight (except the openings for the discharge of the vitiated air at the top and bottom of the room, controlled by valves), and carried up on the inside of the room, with as few angles and deviations from a direct ascent as possible, above the highest point of the roof. When practicable a smoke-pipe is carried up through the entire length of the ventilating flue, or at least a current of hot air is introduced into the upper portion of that flue—so as to establish a motive power, in the same sufficient to sustain a constant draught of vitiated air from the school-room. At the

same time, and as an essential part of the ventilating apparatus, provision is made for introducing a large quantity of pure air in such manner as to secure its diffusion throughout the room, without any perceptible current. The openings for introducing pure air are opposite, and as far off as possible from the openings into the ventilating flue, so as to secure a steady flow of air through the apartment, and in winter the air is moderately warmed by passing over a heated iron surface, placed generally below the floor. A variety of plans, both for the construction and location of the ventilating flues, and of the heating apparatus, can be examined in the volume on "School Architecture," among the American contributions to the Educational Exhibition.

FRIDAY, JULY 14th, at 8 p.m.

ON THE TRAINING OF THE WILL AND THE FORMATION OF HABITS. BY WILLIAM B. CARPENTER, M.D., F.R.S., EXAMINER IN PHYSIOLOGY IN THE UNIVERSITY OF LONDON.

After expressing his hearty sympathy in the movement which the Exhibition and accompanying Lectures were designed to promote, the Lecturer stated his object to be, to bring the scientific principles deducible from the abstract study of the operations of the Mind, to bear upon the practical business of Education. He did not pretend to have anything to communicate that would be new to such as had large experience in this work, and had been accustomed to reflect upon it; but he hoped that even they would find that a scientific comprehension of *principles* would give them a greater command of resources, and more certainty in their use.

The principle which he wished to develope is this,—that the mind, like the body, has an *automatic activity*, in virtue of which it thinks, feels, and reasons, under the influence of external impressions received through the senses, or of the traces left by former impressions: but that the *will*, in virtue of its power of fixing the attention on any one object of consciousness to the exclusion of others, can control and regulate this automatic activity, and can thus turn to their highest account the powers and faculties which each individual may possess.—This he illustrated by reference to various physiological phenomena. The unceasing action of the heart is purely automatic; and, though it is influenced by the emotions, the will has no power to accelerate or retard it. The rhythmical movements of respiration, again, are in themselves automatic; and, although they are placed to a certain degree under the control of the will, for the purposes of speech, yet no voluntary effort can suspend them for a sufficient length of time to produce a serious interruption to the vital functions. On the other hand, the various movements of walking, playing on a musical instrument, &c., which are at first purely voluntary, come by habit to be "secondarily-automatic;" so that, when once put in train by the will, they will go on without any continued voluntary effort or direction of the attention to them, although they may be stopped at any moment by a volitional determination.

Every individual is born with a certain mental constitution—that is, with certain definite *tendencies to thought*;—in other words, an automatic succession of ideas takes place in conformity to certain laws, known under the designation of laws of "suggestion" or of "association," in virtue of which the presence of one idea tends to suggest or call up another, with which it has been previously connected by simple succession, or with which it has some relation of similarity or conformity. The nature of the associations that will thus determine the automatic activity of the mind, varies in each individual, not only according to his original constitution, but also according to his habitual course of thought, so that, secondarily-automatic modes of activity of mind, as of body, gradually come to be established. Of this automatic activity, uncontrolled by the will, we have examples in young children and in idiots, in whom the self-determining power has never been developed; and also in those states of reverie and of involuntary abstraction, in which the mind has passively given itself up to its own unrestrained working; as well as in that familiar state of nocturnal restlessness, in which we are kept from repose by undue mental excitement, and can only procure sleep when we can succeed in forcing the current of thought into some monotonous course. In the well-balanced mind, however, the will has such a dominant power over the attention, as to be usually able to fix it upon any object of thought by which it determines that the mind shall be occupied; the exertion of this power, especially when prolonged, is attended with the same sense of effort as the sustentation of bodily exertion when the muscles are fatigued; and it is of great importance, therefore, so to train the ordinary habits of mental activity, that the will shall be called upon to exert this power as seldom as possible.

The lecturer then showed how essential the exertion of the power of Will is to the attainment of intellectual greatness, instancing Coleridge as an example of one of the most wonderful combinations of intellectual gifts which the world has ever seen, rendered comparatively useless for want of the determination to utilize them. He then showed how the will may elevate the moral and religious character, by fixing the attention upon motives of the higher class, and determining to exclude the action of the lower, thus overcoming temptation and keeping the individual out of the reach of it; and he concluded with expressing his conviction that, as this power of the will over the course of thought is that which is most characteristic of the fully-developed mind of man, as compared with the child or with the lower animals, and as it is that which constitutes his greatest means of self-elevation, so its development ought to be a primary object in all plans of education.

SATURDAY, JULY 15th, at 5 p.m.

ON CERTAIN POINTS OF GEOGRAPHICAL TEACHING. BY R. G. LATHAM, M.D., F.R.S.

A few words explain the points which the lecturer would introduce into geographical teaching. The rest consists of illustrations of what was taught by them. On the diagram-board stand the following words:—

NAME.		MEANING.		LANGUAGE.
Stow	...	Place	...	English
Punj	...	Five	...	Indian
Ab	...	River	...	Indian

These were three names out of some hundreds. They were the names of certain geographical localities or objects. They were *common* names, not *proper*; they had also a meaning in certain languages. Our numerous *stows* were so many *places*. The Indian district of the *Punjab* was *The five rivers*.

Whenever a geographical term has a meaning, let the teacher tell the pupil what that meaning is, and in what language it occurs—and this not now and then, or exceptionally, but regularly. Let the pupil, on his part, trace out the distribution of a given name on the map. It is believed he will find pleasure in this. It is also believed that certain inferences will suggest themselves in such a way as to exercise his mind advantageously, and to supply certain points of knowledge.

A few words for each of the different countries of the world illustrate this:—

Ireland.—*Bally* is *town*; *Sliebh*, *mountain*, in the *Gaelic* language; *Kil* (as in *Kilkenny*) is *cell* in the *Latin*; *Town* (as in *Oxmanstown*) is *English*; *Ford* (as in *Carlingford*) is *Danish* or *Norwegian*. The words like *Bally* (as in *Bally*-na-sloe, &c.)—*i.e.*, the Gaelic words—are the commonest.

Scotland.—*Bally* and other words found in Ireland will

reappear here. *Ben, hill*; *aber* and *inver*, mouth of *river*; (*Aber*-deen, *Inver*-ness;) *Aber* will reappear in—

Wales.—Aber-ystwith, &c.; *Caer Nant*, &c. Common in Wales, rare in England.

England.—Coln (Lin-*coln*) *colony*, *chester*, *camp*. These are *Latin*. The *stows*, *brooks*, *burns*, *hams*, &c. (Wit-*stow*, Spell-*brook*, Red-*burn*, Threking-*ham*, &c.), are English; but they will reappear in Germany, Holland, Friesland, and, more or less, in Denmark, Norway, and Sweden.

In Denmark *by* means *town* or settlement. Observe in what parts of England it does, and what parts it does *not* appear (Spills-*by*, &c.).

The same word may take two or more different forms—*e. g.*, the Latin *castra*, *camp*, may be either *chester* (as in *Chester*-ton, Lan-*chester*) or *caster* (as in Tad-*caster*, &c.). Again, the *ham* in Threking-*ham*, Notting-*ham*, may be *heim* (Oppen-*heim*), *hem* (Berg-*hem*), or *um* (Dokk-*um*). Trace out the distribution here. Wherever you have a form like Tad-*caster* (rather than Man-*chester*) you will find *by's* (Spills-*by*, &c.). Also—

As to *um*, *hem*, *heim*, and *ham*, the first is *Frisian*; the second *Low* German; the third, *High* German; the fourth *Anglo-Saxon*. Trace the forms like Dokk-*um* into Denmark and Sweden; also in the parts about the Hartz. Observe in the parts about the Hartz the form in *leben* and *sleben*.

In *France*, *Spain*, &c., note the Roman words *ville*, *mont*, &c. But also note words other than Roman and Latin. In France, *Seine*, *Oise*, the same as the *Ouse* and *Shannon* in Great Britain; in Spain, the *Guad* in *Guad*-iana, and the same as the *Wadi* in Arabia.

The succession of different languages in the same county is suggested by all this, as is the history implied therein. The learner who works out the distribution of names is discovering, inferring, teaching himself—or, at least, anticipating a certain amount of philosophical and historical instruction.

Lapland and *Finland*.—In words like Quick-*yok*, Kaalas-*yarvi*, *yok* is *river*; *yarvi*, *lake*—in Finn and Lapp. Trace these—the latter far in the direction of Siberia. Also forms in *trask*, *salmi*, &c.

In Russia, *&c.—gora*, *mountain*; *gorod*, *town*; *voda*, *water*, &c., &c.

In Turkey.—Kara, *black*; *dagh*, *mountain*; *su*, *river*—*Karah-dagh*, *Kara-su—black mountain*, *black river*.

Montenegro is called *Czernygora*, and *Karadagh* also. This is because it is on a Turk, Italian, and Slavonic frontier.

Note local peculiarities in the names in Hungary, Albania, the Danubian Principalities, and Lithuania. Every part of the world can be worked in this way. In Africa (*e.g.*) note the form in *ama* (*Ama*-Zulus, near Cape; in St. America those in *agua* (*Achagua*, *&c.*), &c. &c.

Some of these points are so simple as to be above no one's capacity; others are sufficiently high to tax the abilities of the best scholar. Thus they apply to:—

Minute Ethnology.—On the Northamptonshire bank of the river Nene is *Caistor*, on the Huntingdon, *Chesterton*. This is because the *Castra* of the ancient *Durobrivis* has taken a Danish form on one side, a Saxon on the other. There are no places ending in *by* in Hunts, plenty in Northamptonshire. Also—

Ancient Ethnology.—Names in Gaul, like *Nant-uates*, suggest the same as the word *nant* in Wales, viz., a Celtic population. *Marco-manni* is *March-man*, and (as such) German. The *Cerasus* of the ancients may or may not be the Turk *Kara-su*.

Some cautions in the working the higher problem were indicated. The gist of the whole was to show that by an interesting addition to geographical teaching a certain amount of philological and geographical knowledge is anticipated.

MONDAY, JULY 17th, at 5 p.m.

ON THE RELATIONS OF BOTANICAL SCIENCE TO THE OTHER BRANCHES OF KNOWLEDGE. By ARTHUR HENFREY, F.R.S., &c. LECTURER ON BOTANY AT ST. GEORGE'S HOSPITAL.

The lecturer commenced by examining the various kinds of classifications of the sciences which had been proposed, and divided them under three heads, viz.

1. Those based upon the sources of knowledge.
2. Those based upon the purposes for which knowledge is sought.
3. Those based upon the nature of the objects studied.

The first, or subjective classifications arrange the sciences into groups, under the heads of *experimental* and *abstract* sciences; the second into groups of *speculative* and *applied* or *practical* sciences; the principle of the third mode is to class the sciences into a series of groups, related to each other by an order of succession of the complexity of the truths with which they deal.

This objective method was adopted by the lecturer as the most logical, and was shown to have been distinctly indicated by Descartes, although not taken up generally until of late years.

This classification enables us to form a table on which the relations of Botany to the other groups of Sciences are clearly indicated, as dependant on the nature of the objects with which it deals; while it shows the order in which it must be most advantageously studied. In those sciences which precede it we find inquiries upon which it partly depends; in those which follow it, the inquiries in which it can assist us.

1. The Mathematical Sciences, dealing with absolute truths. 2. The Physical Sciences, dealing with truths relative to matter. 3. The Biological Sciences (Botany, Zoology), dealing with the truths relative to life. 4. The Social Sciences, dealing with the truths relative to man.

The relations of Botany to Chemistry, the least general of the Physical Sciences, and with Zoology, which succeeds to Botany in the Biological group, were then briefly examined.

The methods next claimed attention, and it was explained that a particular form of induction—analogical induction—was an especially important instrument in the Natural History Sciences. This method of reasoning being one constantly employed in daily life, Biology hence becomes a most valuable means of intellectual discipline.

Abstract Botany, like Zoology, is divisable into Morphology, Physiology, and Taxonomy or Classification, and the last is based on the first two. The peculiar characters and principles of the Natural Classifications of Plants were then dwelt upon at some length, in regard to Terminology, Nomenclature and Classification, itself, and the important uses to which these might be applied in general education were strongly impressed.

In addition to the bearings on the study of language, it was explained that the method by which species of plants or animals are collected together in groups of progressively greater complexity, is in reality a method applicable to all subjects in which a large number of facts and conclusions have to be arranged according to their mutual bearings, and their relative importance as regards the purposes for which they are classified.

Lastly, the necessary relations of Botany to rational Agriculture were briefly adverted to, as also the dependance of the Paleontological part of Geology and one department of Physical Geography, upon results derived from the study of the natural history of plants.

MONDAY, JULY 17th, at 8 p.m.

ON GOOD AND BAD DELIVERY IN READING. By THE REV. FRANCIS TRENCH.

After a few words on the importance of the art of reading, the lecturer traced out its value from the humblest cases to those of its highest exercises, *e. g.*, from

the child in the nursery or school to the minister in public worship. He then exposed various instances of *bad reading*, spoke of it as widely prevalent, and noticed different causes whence the fault and deficiency arose. He strongly condemned the rapidity of utterance and unmeaning monotony too often allowed in the recitations of our public schools, and expressed the strongest hope that immediate and diligent attention may be paid to the subject in all kinds of educational institutions, with a view to correct an admitted evil of the worst kind.

Carelessness on the part of the reader—the adoption of a mouthing and grandiloquent utterance, by way of adding effect, and many other sources of mischief, were carefully examined. The lecturer proceeded to dwell on the marks of *proficiency* in the art. The first brought under notice was that of *distinctness*. Then followed *attention to prescribed stops and periods*. Then the *separation of sentences*, by the voice, into proper changes, where there were no stops to direct. Then *strength of tone*, and maintenance of a right pitch. Many other topics of a kindred character were brought under consideration, and illustrated by various anecdotes, references to the lecturer's own pastoral experience, and opinions of different writers on these subjects.

The address was concluded by an earnest appeal to the audience, calling upon all present to cultivate personally, and to encourage in every way, the art of good reading. The lecturer then referred to the public addresses of Her Majesty, as an example of what might be done by natural gift and at-tention combined, towards an attractive and effective utterance; and entreated his hearers diligently to exert themselves in their own separate spheres, to attain the same object. He then declared his high sense of the privilege in having had the opportunity to address the intelligent body of his hearers on such a subject, requested any hints or information upon it which any persons might be disposed to send for his consideration, and expressed his conviction that the very lecture thus given must have in itself exemplified a great deficiency in the very art in which he was endeavouringto instruct others. The lecturer concluded with a short, but strong and emphatic statement on the high objects and aims which should ever actuate the reader's mind and heart, whether reading to one or to hundreds at a time.

Tuesday, July 18th, at 5 p.m.

On Playthings and Occupations for Early Childhood. By Herr Hoffmann.

The lecturer commenced by calling attention to the great importance of training children at a very early age, and that this training should not be necessarily left to a distinct class of persons. Parents should take pains to inform themselves on the subject, so as to carry out with their young children a proper system of training. This training may be assisted much by the use of toys judiciously selected. The name of Frederick Fröbel was then remarked upon, as being an earnest follower of Pestalozzi. To him is due the establishment of what are termed in Germany "Infant Gardens," somewhat analogous to the Infant Schools of this country.

Children should not be sent too early to *school*, in the strict meaning of the term, nor should they be placed under a man's direction. Woman is more fitted for this early duty. No preceptors or school masters are wanted; these exist in the objects surrounding the child. These teach him the differences of high, low, round, and square, &c.; a mother's knitting ball, her thimble, and divers other objects are the silent teachers of the foundation of mathematics. He is now taught to distinguish sounds. His fingers are another inlet for knowledge. He learns the various qualities of surrounding bodies—hard, soft, warm, cold, &c. The first six years are years of self-instruction; supply children with objects; let them amuse themselves with them, and they insensibly acquire a large amount of useful knowledge, which forms the foundation for their future learnings. Do not attempt to give book-learning at an early age; time is rather lost than gained by such attempts. The simpler the playthings the child has the better; let them be suggestive and capable of bringing out his faculties.

The lecturer then proceeded to show how, by the employment of a few cubical pieces of wood, many various forms could be made, which would amuse and instruct children at the same time. He also showed how, by means of thin strips of deal, about a foot long, a variety of different flat geometrical figures, both simple and complex, could be made by interweaving them. By means of peas softened by soaking in water, and small pieces of wood of the size of lucifer matches, various cubical geometrical figures, illustrative of the forms of crystals, could be cheaply and readily made. All these are suggestive to the child's ingenuity, and give him self-occupation, which at the same time is self-teaching.

Wednesday, July 19th, at 3 p.m.

On Writing. By Mr. Horace Grant.

The importance of legible writing must be admitted by all; still, however, daily practice shows how little attention is paid to it.

The consequence of bad writing is loss of time both to the writer and his correspondent. A well-written letter is easily perused, whilst one badly-written takes a long time to read. The correspondent makes mistakes in dates, names of places, and amounts of money. The writer, too, has no inducements to read over his letter, and then further mistakes occur. As to signatures, there is no signature so easy to imitate as an illegible one. A clear, bold, rapid signature is a great impediment in the way of an imitator. Bad writing is apt to make a man dislike writing at all, and a bad writer thus frequently neglects to write when he ought. Again, as to signatures and addresses, if not clear, they present more difficulties in deciphering than bad writing in the body of the letter, where the context frequently helps. For writers for the press, clear handwriting is very essential; Porson and Dr. Parr were referred to, the former for the perfection of his writing, the latter for the contrary quality.

The main principles on which a legible, rapid, easy, and sightly handwriting, depend were then pointed out. Posture and light are very important to the constant penman. The position of the body should be easy and natural—the body nearly upright, resting principally on the left arm: no weight on the right hand or arm, which should be quite free, supporting their own weight on the wrist and third or fourth fingers. The feet should not be contracted; the toe should be supported by a footboard, rather higher than the heel. The height of the seat should be adapted to each individual. The quality of the light, whether natural or artificial, must be attended to. If the eyes are used much by candlelight, careful ventilation is essential. A round hand is more legible than an angular hand: this was made clear to the audience by examples on a diagram. An upright is also more legible than a slanting hand; the examples on the diagram showed this. A wide, sprawling hand is difficult to read, and an excessively close, narrow hand also fails. The writing should be neither too large nor too minute.

Regularity and straightness of line and equality of space are conducive to legibility. The spaces between the words should be sufficiently large to keep each word distinctly separate. Spaces between letters should be greater than between parts of letters; long loops and tails are bad, as interfering with the lines above and below. Short loops and tails are unfavourable to distinctness. Extraordinary difference in the thickness of the component parts of lines renders the writing indistinct. The diagrams illustrated these points.

Great rapidity is important, and a good position of the body is essential to this. The movements of the hand should be confined to the two end joints of two fingers and the thumb, because these joints move with much greater rapidity than the larger joints of the wrist and elbow, and are much more under command for small movements. Some masters teach that the fingers should be rigid, and that all movement should come from the wrist. This is wrong. The lecturer illustrated by his diagrams that a round hand is more rapid than an angular one. The angular one consists of a series of rapid jerks, while in the round hand the consecutive letters glide readily into each other. There is a great loss of time in taking off the pen in forming the letters. A rapid penman, who understands his craft, rarely needs to take off his pen in the middle of a word, and may even write several words without doing so, provided he keeps proper distances between his words. Again, a series of short lines can be made faster than long ones; a small hand is, therefore, more rapid than a large one, a close hand than a wide one, and an upright than a slanting one. Flourishes, loops, &c., are a waste of time. Capitals should be written distinct, and with a view to their junction with other letters. Schoolmasters should study the principle of rapid writing. Regularity and beauty of form are very important. A hand faulty in many respects is comparatively agreeable to look at if perfectly regular.

The German and French hands were specially pointed out as very deficient in the essentials laid down by the lecturer. The lecturer then referred to the quill and the steel pen; the former, unfortunately, though still the best, required more skill than is usually to be met with, for keeping it in order. The steel pen, which he hoped would be improved, was a great boon to the mass of writers. The quality of the paper must be attended to; the pen alone is the best judge of this. A good quality of ink, too, must be carefully selected.

NEW YORK INDUSTRIAL EXHIBITION.

Sir Charles Lyell's Report on the Topographical and Hydrographical Department.*

Under Class X., "Topographical and Hydrographical Surveys; Charts and Maps," the only works which particularly claim attention, are the maps of the United States Coast Survey, (by far the most important scientific work now in progress in the United States,) under the charge of Professor A. D. Bache, and the Wind and Current Charts of Lieutenant Maury.

The importance of an accurate survey of the coast was felt at an early period, and a plan for the execution of a complete geodetic and hydrographical survey was adopted by President Jefferson, who appointed the late Mr. F. R. Hassler to the office of Superintendent. From various causes the prosecution of the work was delayed until the year 1832, though a commencement had been made on the Bay of New York, in 1817. "At the time of Mr. Hassler's death, which occurred in 1843, the survey had been extended from the base near New York, eastward to Rhode Island, and southward to the capes of the Delaware and the upper part of Chesapeake Bay. Professor Alexander Dallas Bache was appointed Mr. Hassler's successor; and under his direction the survey has been expanded in all its branches, and vigorously prosecuted up to the present time. According to the plan developed by Professor Bache, the operations are carried on simultaneously on different parts of the coast, which, for the purposes of the survey, is divided into eleven sections, in each of which the survey is executed independently on its own base line and geographical determinations. When completed the whole will form a continuous survey of the coast, presenting an unbroken chain of triangulation, with several base lines verifying each other, and numerous determinations of latitude, longitude, and azimuth, fixing geographical positions, and contributing largely to our knowledge of the figure of the earth. The general plan of the survey may be briefly stated as follows:—After a reconnaissance to determine the best plan of work, a base line is measured, and a primary triangulation, having sides as long as the limits of vision or the nature of the country will allow, is carried on along the coast. Astronomical observations to determine the latitude and direction of the meridian are made at a number of the stations, and the longitude of some cardinal point in each section is determined. Magnetic observations are also made, furnishing the variation of the compass for the charts, and incidentally the elements of the earth's magnetism. On the sides of this primary triangulation is based the secondary triangulation, determining prominent points a few miles apart along the coast and bays, furnishing points of departure and checks for the topographical survey, which is next executed. The hydrographical survey lastly furnishes soundings and observations on tides and currents, and completes the material required for the charts, which are drawn, engraved, and printed in the office of the Coast Survey. The *personnel* of the survey consists of civilians and military and naval officers; the first class forming a permanent nucleus, and being composed of persons of scientific and practical ability, a great part of whom have been trained to the work under the present superintendent; while the officers of the army and navy are put upon the survey or withdrawn from it, according as their professional duties may permit. The geodetic and topographical work is performed by the civilians and army officers, while the hydrographical survey is made by officers of the navy, all acting under the immediate orders of the superintendent, and reporting their results to him. A unity of plan is thus secured, highly conducive to accuracy and despatch, and which has not been attained on similar works in other countries, where the geodetic and hydrographic surveys are carried on separately; in consequence of which the latter fails to derive from the former those data which are essential to its perfection."

Up to the year 1853, six principal base lines had been measured. These base lines are in the States of Massachusetts, New York, Maryland, North Carolina, South Carolina, and Alabama. Two of these are now connected by a primary triangulation. These two, as well as the third, were measured with the apparatus designed by Mr. Hassler, the measurement being made with iron bars and by optical contact. "The subsequent bases have been measured with an apparatus designed by Professor Bache, and constructed under his direction in the office of the Coast Survey. In this apparatus the measuring bars are arranged upon the compensating system, first used by Colonel Colby in Great Britain, and by Mr Borden in the survey of the State of Massachusetts, but the mode of obtaining the compensation differs entirely." "The sections of the bars are so proportioned to their conducting power and specific heat, as to cause both to have the same temperature during variable temperatures of the atmosphere, their surfaces being easily made to absorb equally by giving them the same coating. The lever of contact and level, first used in the adjustment of standard measures by Bessel, has been adapted to this apparatus; the contact between two sets of bars being made by a blunt knife-edge and a plane of agate." "The instruments used for measuring the angles of the primary triangulation are a 30-inch theodolite (designed by Mr. Hassler), and a 24 inch theodolite, by Troughton and Simms, both fitted with reacting micrometer microscopes, and a number of 12 and 10-inch repeating theodolites, by Gambey." "The average correction to an

* New York Industrial Exhibition. Special Report of Sir Charles Lyell, presented to the House of Commons by command of Her Majesty, in pursuance of their address of February 6th, 1854. Harrison and Sons.—An Abstract of Sir C. Lyell's report on the Geological Department, will be found in the last number of this Journal.

observed angle required in the eastern section, where the stations are on natural elevations, and the sides average over 40 miles, is about 0″·4. In the southern sections it is rather larger. The limit of error allowed in a primary triangle is one second to an angle; this, however, is seldom reached in fact."

Observations of *latitude* are made at numerous stations of the primary triangulation. Different methods and instruments have been used from time to time, but now the *zenith telescope*, or equal altitude instrument, made on Captain Talcott's plan, seems to be the greatest favourite. "In practice, from 35 to 40 pairs of stars are observed at a station, with three or four observations on each pair on different nights. The average probable error of a north polar distance in the British Association's Catalogue is 1·7, while the probable error of an observation with one of the zenith telescopes, as constructed by Simms, is about 0″·5." "A new zenith telescope, constructed recently by Mr. Würdemann, of Washington city, on an improved plan, has been found to give results with a much less probable error than the former instruments." "When the latitudes observed at different stations are referred to one another by means of the geodetic differences of latitudes, there appear discrepancies much larger than could result from the residual probable error of observation, which can only be ascribed to local irregularities in the figure and density of the earth, and which are designated as *station errors*." "The elements of the figure of the earth, used in these comparisons, are those obtained by Bessel in his last discussion of the results of ten measured arcs. It is interesting to know, that the observed difference of latitude of the extremities of the arc at present passed over by a connected triangulation agrees very closely with the geodetic difference computed on Bessel's elements." "Observations of *azimuth* are made at all the latitude stations. The instruments employed are the same that are used for the angles of the primary triangulation. "Observations of local time are made in connection with those of latitude and azimuth, the instruments employed being generally portable transits of from 26 to 48 inches focal length, constructed by Simms of London, and Würdemann of Washington. Chronometers by the best makers are used in preference to clocks (except for telegraphic determinations of longitude), on account of their greater portability and the half-seconds beat. In order to fix American *longitude* in reference to European observations, observations of eclipses, occultations, and moon culminations, made at different American observatories previous to 1844, as well as the corresponding observations at European observatories, have been collected and reduced; and similar observations have since been continued at Cambridge in Massachusetts, Philadelphia, Washington, Charlestown, and Cincinnati. All these stations being connected by the electric telegraph, their differences of longitude have been determined with great accuracy, and all the results are referred to Cambridge as a common station of reference. The difference of longitude between Cambridge and Liverpool has also been determined by means of a large number of chronometers carried repeatedly between the two stations on the Cunard steam-ships." "The differences of longitude between Cambridge and the principal stations of the survey in other sections are determined by the aid of the electric telegraph, where the latter has extended. The manner in which the difference of longitude is obtained may be briefly stated as follows:—Transit instruments are mounted at both stations; at one of them an astronomical clock makes a record of its second's beats on a sheet of paper, by breaking a galvanic circuit which passes through both stations each time the pendulum passes the vertical; the times of a star's crossing the wires of the transit at each station are recorded on the same sheet by the observer's breaking the circuit by pressing a key the instant the star appears bisected on the wire. The passages of the same star over two different meridians are thus recorded by the same time-piece, and the difference of longitude results immediately after applying the necessary instrumental corrections." "By means of the electro-magnetic register and telegraph, differences of longitude are determined with an accuracy nearly approaching that of the latitudes, and arcs of parallels may be measured with the same facility as arcs of the meridian." "Observations of *magnetic declination*, *dip*, and *intensity* are made at all astronomical stations, and at many other points where it is desirable to know the declination for purposes of navigation. The instruments employed are similar to those used in the British magnetic surveys." "The *heights* of the trigonometrical stations above the level of the sea are determined generally by observations of reciprocal zenith distances, frequently checked by direct levellings from the ocean. Interesting observations are in progress to compare results obtained by these methods with barometric and thermometric measurements of heights.

"The *topographical survey* is executed with the plane-table on scales of $\frac{1}{5000}$, $\frac{1}{10000}$ and $\frac{1}{200000}$ of nature, according to the importance of the locality and the amount of detail to be represented. On the sheets drawn in the field the irregularities of the surface, hills, and depressions are indicated by horizontal curves, drawn at certain fixed vertical distances from each other. In the reduced drawing for the engraved charts, the spaces between these horizontals are filled up with *hashures*, the shade being darker in proportion to the steepness of the slope, according to a system somewhat modified from that of Lehman. Scales of shades showing the distance between the hashures and the strength adapted to different scales of the maps, have been printed. The absence of very steep slopes and predominance of small ones rendered necessary the modification of the Lehman system. The topographical survey is carried inland as far as required for purposes of navigation and the defence of the coast.

"The *hydrography* is next in order. Soundings are taken with such frequency, as to exhibit the configuration of the bottom with sufficient minuteness for the purposes of navigation, the number of casts depending on the greater or less irregularity and slope of the bottom. The positions of the casts are determined in reference to the trigonometrical stations, generally by means of angles measured with the sextant at the place of sounding, and sometimes by the use of theodolites at two shore-stations; the latter especially in off shore work, and in cases where great accuracy is desired. Great aid is also derived from the outlines of the topographical survey in fixing positions, as well as in determining the *lines of equal depth*, which are drawn on the chart for every fathom down to three or four fathoms. The spaces contained within the several *fathom curves* are shaded by dotting, lighter shades corresponding to greater depths. The configuration of the bottom is thus graphically represented to the eye, and the direction and limits of channels are conveyed to the mind in a more rapid and comprehensive manner by mere inspection, than could be done by a close examination of the figures indicating the depths, which of course are also given. The soundings extend from the shore and the head of tide-water generally, out to sea as far as soundings can be of use to navigators in determining their position." The sounding leads are provided with an apparatus to bring up a portion of the bottom, specimens of which are deposited in the archives of the Coast Survey. It is not impossible that science may here supply the mariner with another mode of determining his position at sea. The subject of *tides* is receiving great attention, not only with reference to local tides and currents, but the general laws of the phenomena, both on the Atlantic and Pacific coasts, are under discussion. The direction and velocity of tidal currents, as important to navigators as the rise and fall of the water, are also observed with care.

In connection with the hydrography the present Superintendent has undertaken the *exploration of the Gulf Stream*. Within a few years also Professor Bache ex-

tended the Coast Survey to the Pacific coast of the United States, which had suddenly assumed a great importance in a commercial point of view.

"The results of the field-work are prepared for publication at the office of the Coast Survey in Washington city. The original sheets containing the topographical and hydrographical work, are combined and reduced to the scale of publication by regular draughtsmen in the office. The beauty and accuracy of these drawings can scarcely be surpassed. The maps and charts are of three classes,—charts of harbours, maps of portions of the coast, and sketches of discoveries, &c. The scales of publication vary from $\frac{1}{10000}$ to $\frac{1}{400000}$, according to the detail to be represented. The charts are engraved on copper by a corps of engravers in the office, among whom are some first-rate artists. When ready for publication the plates are multiplied by the electrotype process; the originals are preserved in the archives, and the electrotype copies are used in printing. Large charts are sometimes engraved in two or four separate pieces, and then joined on a common electrotype plate; by this means great despatch may be effected, as several engravers can be engaged on the chart at the same time. The prices at which the charts are sold are extremely low, ranging from fifteen cents to one dollar. *They are freely distributed to all educational institutions, libraries, &c.* In conclusion it may be observed that the funds for carrying on the survey are voted annually by Congress, upon estimates submitted by the Superintendent, and the work above sketched out is executed in a manner as economical as it is accurate and comprehensive."

The Natural History Charts, executed by James D. Dana, A.M., in which the geographical distribution of marine animals, especially that of the different species of crustacea, are then referred to; and it is stated that the author has laid down on his map the isocrymal lines on the zones of greatest cold on the surface-waters of the ocean, in preference to the isothermals usually traced on maps descriptive of climate, since he finds that they are of higher importance in limiting the range of marine species.

The Report concludes by alluding to the Wind and Current Charts published by Lieutenant M. F. Maury, U.S.N., Superintendent of the National Observatory at Washington; and to the Maritime Conference held at Brussels in August last year, for the purpose of concerting a plan of combined operations, whereby the physical features and meteorology of the ocean might best be explored, and a record kept of scientific observations calculated to promote the progress of navigation. As the report adopted by that Congress has already appeared at length in this Journal (vide No. 48, page 582) it is unnecessary to do more than refer to it on the present occasion.

Home Correspondence.

PUBLIC LOCAL EXAMINATIONS.

Crosby Hall, July 10, 1854.

SIR,—I regret that my duties elsewhere prevented my attending the Meeting of Delegates on Tuesday last, when the subject of Public Local Examinations, with special reference to Lord Ebrington's letter of June 28, (in your former paper) was discussed.

Permit me to record my opinion in favour of periodical examinations at the different local Institutions with the prospect of some eventual distinction, and to explain the operation of one of the Societies in Union, wherein much of the work recommended by Lord Ebrington is at present done, and the opportunity is offered for its wider application.

The Committee for the Metropolitan Evening Classes for Young Men at Midsummer, 1852, invited the members of the respective classes to a voluntary examination, promising at the same time to keep a record of those that might be thought worthy of distinction upon such occasion.

They appointed a Council of Examiners, consisting of head masters of our grammar schools, professors of King's College, and one or two other distinguished educationalists.

Forty young men presented themselves for examination: One in Hebrew, nine in Greek, three in Latin, eleven in French, four in German, ten in Drawing, and thirty-eight in general subjects, as Bible knowledge, English Grammar and Literature, and Geography. The Examiners who attended were the Rev. Dr. Russell, Rev. Dr. Wilson (Dean of the College of Preceptors), the Rev. H. G. Liddell, the Rev. Alfred Povah, the Rev. Dr. Butler, the Rev. Charles Mackenzie, Professor Brasseur, and M. Wattez.

The contents of the Bible were made an element in the examination, but although the Committee are of necessity members of the Church of England, no peculiarities in Theology are required of their students, only a knowledge of the contents of the Holy Volume.

From some neglect in publishing a form of certificate, the next year found the young men less earnest about the Annual Examination, and only nine were thought worthy of distinction. Of these, two were placed in the first, and seven in the second order of merit under their respective studies, separate certificates being prepared for the several languages, and a general one for the combined subjects already noticed.

On the 3rd inst. we met for the third Examination, and forty-five students were examined by Dr. Wilson, the Rev. Alfred Povah, the Rev. Charles Mackenzie, M. Wattez, Dr. Bernays, and Sig. Valetta, in Greek, Latin, French, German, Italian, and English.

The Reports from the Examiners are most encouraging, but the class-list is not yet prepared. I enclose, however, a copy of our certificate, which is intended to indicate the industry and application of the person to whom it is granted during the last year, in the hope that it will find a place in your Educational Exhibition.

Herein you may recognise a system of encouragement calculated to improve the status, and gratify the honourable ambition of the young men of London, and, if generally accepted, paving the way for that higher system of honours which may be hereafter offered by the Society of Arts. Agricultural Societies in different parts of the country, colleges in cathedral cities, the College of Preceptors in London, Gresham College (if it could be made available), and our Evening Classes for Young Men, with other Institutions might occupy the position of several colleges, at which a certain curriculum of study must be pursued, and a certain number of examinations passed with credit before the Members could be admitted as candidates for your honours holding the relative rank of a University examination.

The time perhaps is now arrived when we may hope to do this with success, and really to establish colleges for the people; for of the two things that have been wanting one is now given, and we have a prospect of the other. The countenance and concurrence of the nobility, clergy, and gentry, were long desired in vain. But now your Society, and many in union with it (and emphatically among these the Metropolitan Evening Classes for Young Men) have the avowed patronage of H.R.H. the Prince Albert, and the highest sanction in the Church, while men of all ranks, eminent alike for their philanthropy and their talents, are freely delivering valuable lectures in their several halls and theatres.

The other deficiency, so long experienced and not yet fully supplied, is in that vulgar but necessary commodity —money. All these efforts, especially at starting, are expensive; for those who should make them self supporting are not yet sufficiently educated to feel the value of paying for their own education. Although there ought to be no difficulty about the principle of assisting the

poorer man to gain more knowledge, when we remember how much many of us were indebted to the liberality of our ancestors for those endowments which enabled us to run an expensive school and university career, we all find a difficulty in eliciting from the present generation sums sufficient for the purpose; but "the coming man" is "looming in the distance." The Charity Commissioners are again at work, and surely they will compel treasurers who have funds not applied or misapplied, to direct them into those channels of usefulness which are already prepared throughout the land to drain off the pernicious waters of ignorance, infidelity, and vice, and to supply such refreshing streams of pure knowledge as shall fertilize the country that they traverse.

Feeling that the example we have adopted is of easy application, and hoping that it may be extensively followed, I have, &c.,

C. MACKENZIE, A.M.
Hon. Sec. to the Evening Classes for Young Men in London.

EAST AND WEST INDIAN FIBRES.

44, Myddelton-square, Pentonville, 17th July, 1854.

SIR,—The question of the provision of material for the manufacture of paper, as well as for textile purposes, in substitution of the flax and hemp of foreign growth, loses none of its interest. That interest, as far as public discussion of the question goes, may be said to have sprung from the able and interesting lecture given by Dr. Royle, in the Society's Rooms, on the 12th April, as reported in the Journal of the Society, Vol. II., No. 73.

The few general statistical facts which I had the opportunity of offering to the notice of the meeting, in the discussion that succeeded to the lecture, have created surprise in some quarters, from the high figures that were necessary to express the amount of import and consumption of the various substances to which reference was made. It has been said that the quantities named by me were in excess of the truth. In consequence, and with a view to rest the evidence of the correctness, or otherwise, of my statements, on undeniable data, I drew up, and placed in the hands of a member of the House of Commons, two motions, calculated to lead to that evidence being clearly obtained. Returns have been made to those motions, and printed by order of the House, giving the information required for each of the fifty-three years of the present century.

The points which it was important to establish were, the amount of importation of Flax and Hemp, distinguishing the quantities received from Russia from those received from all other parts; and the amount of the import and export of Rags. The first of these questions, showing to what extent the war in which we are engaged may imperil the supplies of those portions of fibrous matter essential to various manufactures; the second, establishing the limited amount of material for paper for which we depend upon foreign countries.

What I stated on the 12th of April was, that "the quantity of fibrous substances of all kinds imported into the United Kingdom last year was 614,000 tons; and deducting 72,000 tons exported, there remained for home consumption 542,000 tons. Of this quantity 94,000 tons were flax, and 63,000 tons hemp; and of these two articles 64,000 tons of flax, and 42,000 tons of hemp, together 106,000 tons, came from a country to which I would not more particularly allude (Russia)."

And in speaking of paper I said, "that the amount manufactured in the five years from 1830 to 1834, both inclusive, was 354,940,658lbs., or an average of 70,988,131lbs.; and in the five years from 1849 to 1853 the manufacture increased to 756,170,893lbs., being an average of 151,234,178lbs. per annum. Last year the amount manufactured, in round numbers, was 177,000,000 lbs., against 154,000,000lbs. in the previous year, showing an increase of above 23,000,000lbs. in one year." Every figure above stated (fractions of whole numbers excepted), I have, by subsequent examination, established as correct.

Let me now show the quantities contained in the parliamentary return in a condensed form:—The total quantity of flax imported in the whole term of fifty-three years, was 2,252,422 tons; of which Russia furnished 1,587,395 tons; and the rest of the world (all foreign) 665,027 tons. Of hemp, the total importation was 1,829,291 tons; of which Russia furnished 1,505,189 tons; and the rest of the world, including India, 324,102 tons.

We see here, then, that we have received from Russia, in the last 53 years, the following quantities and value of flax and hemp; the valuation being made, for the whole term of years, at the moderate rates of £40 per ton for flax, and £35 per ton for hemp:—

Of flax	1,587,395	tons, worth		£63,495,800
Of hemp	1,505,189	„	„	52,681,615
Together	3,092,584	„	„	£116,177,415

In a few observations which I committed to paper upon this question, I maintained, as I do now most strenuously maintain, that every pound of this enormous quantity and value of material, so obtained from Russia, "giving extensive employment to the Russian peasantry, and enriching the nobles of Russia," in "the same materials, or others of equal value, could have been obtained, for the last hundred years, from our own possessions, east and west, within the tropics; giving a corresponding amount of employment to our own fellow-subjects, and conducing largely to individual, colonial, and national benefit."

This doctrine of supporting our own Colonial possessions in preference to foreign states, for supplies of products of the same character obtainable in each, I know to be very unfashionable in many quarters. Upon this question, a weekly commercial publication, conducted with great talent, in an article in a late number, upon this subject (*Economist*, *July* 1, p. 700,) is at issue with myself and others who may happen to think with me in the matter.

The *Economist* says—

"Some persons, amongst the rest Mr. Sharp, whose pamphlet we have referred to, seem anxious to profit by present circumstances, to bring forward the fibrous productions of India, to the exclusion of those of other countries. Their object is not trade, but to give employment to our fellow-subjects in our colonies and dependencies, to the exclusion of Russians and Americans. This means, in the main, we believe, enriching some few hundred or thousand of our countrymen, who have estates, or a pecuniary interest, in the East and West Indies. At the same time, a factitious system of State patronage, directed to this end, would obviously injure, in an equal or greater degree, all the persons engaged in the shipping and in the trade with those countries, from which our too zealous patriots wish to exclude supplies."

Now, with all submission to the talented editor of the *Economist*, this is rather begging the question. True, we do seek "to give employment to our fellow-subjects in our colonies and dependencies," even were it, *pro tanto*, "to the exclusion of Russians and Americans." But we do not ask for "a factitious system of State patronage directed to this end." We ask for no special or factitious patronage—no system of exclusion—nor even for support, beyond that to which the intrinsic merits of the colonial products may entitle us. But we do seek to bring those products into fair competition with foreign commodities; and it will go hard with us but we will accomplish so much. At the same time we do also feel an interest in seeing "enriched some few hundred or thousand of our countrymen, who have estates or a pecuniary interest in the East and West Indies"—and who stand much in need of such an improvement in their circumstances—rather than that such wealth should continue to flow into the pockets of a few hundred or thousand Russian nobles or proprietors, having estates or a pecuniary interest in the soil

of that country. The ground of our wish and interest in this respect may appear to some very simple, but we think it is not very unnatural, however it may expose us to the serious charge of being "too zealous patriots."

What the Russian noble or proprietor gains it is fairly presumable he spends in Russia. What an East Indian or a West Indian planter, or a British merchant gains, it is equally presumable that he will spend here or in the colonies. And if the 100 millions sterling paid for flax and hemp to Russia, in the first half of the present century, should be partly or wholly transferred into the pockets of British subjects, in our own colonies and at home, in the second half of the century, it would be difficult, I imagine, to discover in that fact any particular cause of regret.

In like manner, we have yet to learn how, as it is stated, we should, by our proposed measures, "obviously injure, in an equal or greater degree, all the persons engaged in the shipping and in the trade with those countries from which our too zealous patriots wish to exclude supplies." As regards shipping, it is by no means obvious to us, nor, in truth, can we at all comprehend, how 100,000 tons of shipping employed in bringing flax and hemp from St. Petersburg, Riga, or Archangel, would be prejudiced, if they had to bring the same quantity from Calcutta, or Ceylon, or Jamaica, or British Guiana. The opposite of injury would seem to be the more probable result.

Again, with regard to the editor's remark, "We have no wish to see the sails of our ships made by hemp grown in India, in preference to hemp grown in Russia"—we avow in all candour, that *we* have such a wish—all questions of quality and price equal.

With just an equal degree of reason could the arguments I have here contested be applied to the cultivation of flax in Ireland; where it is most gratifying to observe the large and satisfactory progress recently made, both in its growth and preparation, as proved by the valuable Agricultural Statistics with respect to that country; and which it would be well to see applied to the other portions of the United Kingdom.

The average annual importations of these articles from foreign countries, for the last three years, were, of flax, 75,000 tons, and of hemp, 33,000 tons, together 108,000 tons; of which the average quantity received from Russia was 84,000 tons per annum.

If I were to enumerate the countries from which we can obtain those materials that would be perfect substitutes for the foreign productions, beginning at the points nearest home, I would say Jamaica and British Guiana, our two principal possessions in the west; from which there would be no difficulty in obtaining half of the entire quantity, or above 50,000 tons, with such arrangements as those to which the measures I have taken will lead. And, to travel eastward, to more remote dependencies, the remaining half there would be no difficulty in obtaining from the Presidencies of India, especially the Plains of Bengal; and from the Islands of Ceylon and the Mauritius.

Much has been said, in years past, of the sound policy of obtaining the raw materials of our several manufactures at the lowest possible rates. Hence the removal of all duties on such importations. If, then, as I contend, we can obtain from our colonies and dependencies, raw products of equal, many of superior, value to those supplied by foreigners; such materials being deliverable in this country, for purposes of manufacture, at prices below the average rates of foreign articles (not the present high rates, but current peace prices), thus accomplishing, in a marked degree, the object proposed by the removal of all duties on raw materials—if, I say, all these things can be, as they will be, accomplished, it may fairly be asked, if we are not justified in seeking "to give employment to our fellow-subjects in our colonies and dependencies," rather than to foreigners, and especially to Russians?

If there be any country with which our commercial relations are of a nature to warrant a desire for a transfer of interest to other quarters, that country (putting all present quarrels out of the question) is Russia. I have not the means at hand to state the general amount of our imports and exports for every year of the last half-century, the same as the Returns under notice enable me to do as regards flax and hemp. The import of last year from Russia, in these two articles, was to the amount of four millions sterling. Add to this the value of tallow, timber, corn, and linseed, each imported to a large amount, and the various other articles to a less extent imported in the year, and I believe it will reach about eleven millions.

And what were our exports to Russia, of British and Irish produce and manufactures, in the year 1852, the latest date to which the public accounts are made up? Just £1,099,917; or a tenth part of the value of our imports. Some trade returns before me, for the 13 years from 1840 to 1852, show the total exports to Russia to be £22,179,290, or an annual average of £1,706,099; that average, be it observed, being above 50 per cent. more than the last year's trade; whilst I see that the two articles of flax and hemp alone, imported from Russia in the same 13 years, were worth above £36,000,000 sterling.

It is a striking fact, in connection with our commercial relations with Russia, that, if we only go back seven or eight years, in our inquiries into the state of that trade, we shall find that from that period to the present, our imports from thence have increased by some millions sterling per annum; whilst our exports to that country have diminished nearly one-half. The amount of British and Irish produce and manufactures shipped in 1845 being £2,153,491; and in 1852, only £1,099,917; the diminution having gone on gradually for several years down to 1852, the smallest amount on record for 20 or 30 years.

Nor is there the least chance, on the return of peace, of any relaxation in that rigid system of exclusion in Russia which shuts out almost everything but those articles that are of indispensable necessity to the successful prosecution of her own manufactures; or that, being of the number of her urgent wants, she is wholly unable to produce. With such a drain of our metallic currency as that to which the state of our commercial relations with Russia has hitherto been calculated yearly to lead, I must confess that I have no sympathy.

But these importations of raw material from our own possessions will have a most beneficial effect upon that important element of public economy, to which I will now again shortly advert—I mean the manufacture of paper: the difficulties of which branch of trade, in obtaining adequate supplies of sound materials, it is needless to dwell upon.

The importation of rags of every description, in the last 53 years, was 346,554 tons, or an average for the whole term of 6,539 tons per annum. We exported in the same period, 12,296 tons, of which 10,146 tons were British and Irish rags; and only 2,150 tons foreign rags re-exported; and of the quantities so exported, 4,206 tons, or about 35 per cent. of the whole quantity in 53 years, was exported in the last two years, almost wholly to the United States. The quantity of imported rags now employed for paper, is only about 6 per cent. of our whole consumption, and is considerably less than it was 20 years ago. The average annual quantity of imported material left for home consumption, for the whole term of 53 years, was 6,307 tons; the average of the last three years was 7,745 tons; and that of the ten years 1831 to 1840 was 9,306 tons; at which latter period the manufacture of paper was less by above 100,000,000 lbs., or between 45,000 and 50,000 tons per annum, than the present production. No wonder that under such circumstances there should be an outcry for a supply of more and better materials, since the scarcity which exists compels a resort, by a great number of paper-makers, to every species of rubbish that can be made to hold together. That supply, both in quantity and quality, can be obtained from the colonial fibres to which I have here adverted. With the exception of a very minute quantity of what is

known as "New Cuttings," the greatest proportions of even the best rags we get are—what? Why, the shirts, bed and table linen, and all other articles of consumption, worn and washed until they are half rotten, and are beginning to fall to pieces. They are then in a fit state for the paper-maker, who is expected to produce from this half-rotten material perfectly sound paper of the best quality! This is no fanciful picture, but one which will come home to the understanding of any man of common sense, who may give himself the trouble to reflect at all upon the subject.

Then what are the fibres, the product of, and proposed supply from, our own Colonial possessions? They are the pure virgin material, in its native state, from which are produced, by spinning, weaving, and bleaching, those "New Cuttings" so prized at a high value by the best paper-makers; but which said "New Cuttings" have to be torn to pieces by violent means, and reduced to their primitive element of fibre, before they can be brought to a state of pulp fit for the machine.

Can there be any doubt, then, with reference to the question of paper, that sound policy must dictate the extensive procurement of that material, the production of our own territories, which will establish the reputation of English paper on a firm basis, and give extensive relief to other and various manufactures; if there be any man who, upon reflection, can entertain doubts of such a policy, that is not the man to whom these observations are addressed.

I am, Sir,
Your most obedient servant.
J. B. SHARP.

MEETINGS FOR THE ENSUING WEEK.

MON. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Rev. Dr. Booth, "On the Influence of Examination as an Instrument of Education."
— Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Mr. Hullah, "On Music as an Element of Education."
TUES. Horticultural, 3.
Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Rev. Professor Baden Powell, "On Elementary Instruction in Mathematics."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Mr. Sopwith, "On Models and Diagrams."
Zoological, 9.
WED. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Rev. J. P. Norris, "On School Discipline, and its Effects on the Behaviour of Children."
Royal Botanic, 3½.—Promenade.
THURS. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Rev. Professor Baden Powell, "On Elementary Instruction in Astronomy by Means of Models."
FRI. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Dr. R. G. Latham, "On the Studies connected with Geography, and on the Relations of that Science to other Branches of Knowledge." No. 5 of a Series.
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Hon. Henry Barnard (Superintendent of Common Schools in Connecticut, U.S.), "On the Public Schools of New England."
SAT. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Professor Creasy, "On the Relations of History, Biography, and Political Economy to other Branches of Knowledge." No. 6 of a Series.
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Mr. Jelinger Symons, "On Industrial Schools."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 11th July, 1854.

Par. Numb.
342. Bank of England—Returns.
356. Postage (Army and Navy)—Returns.
187. Bills—Highways (Public Health Act).
192. Bills—Metropolitan Sewers.
195. Bills—Public Health Act Amendment.

Delivered on 12th July, 1854.

349. Emigrant Ships—Second Report from Committee.
354. Post Office Department (Packet Service)—Estimate.
359. Secretary of State for War—Estimate.
353. Militia Estimates—Report from the Committee.
196. Bills—Real Estate Charges (as amended in Committee, and on consideration of Bill as amended).
197. Bills—Youthful Offenders (as amended in Committee, and on Consideration of Bill, as amended.)
199. Bills—Chancery Amendment.
200. Bills—Returning Officers.

Delivered on 13th July, 1854.

346. Indian Corn, &c.—Return.
480. Gold—Return.
189. Bills—Militia (Scotland).
201. Bills—Royal Military Asylum.

Delivered on 14th July, 1854.

306. Ordnance—Supplementary Estimate.
202. Bills—Jamaica Loan.
203. Bills—Medical Graduates (University of London, as amended in Committee and on Recommitment.)
New York Industrial Exhibition—Special Report of Mr. Dilke.
Promotion in the Army—Report of Commissioners.

Delivered on 15th and 17th July, 1854.

361. British Museum—Return.
382. Ships "Hope" and "Leila" (Bahamas)—Return.
367. Public Houses—Report from the Committee.
372. Bishop of New Zealand—Copies of Letter, &c.
301. Statute Law—Report of Mr. Bellenden Ker.
302. Statute Law—Second Report of Mr. Bellenden Ker.
371. Standing Orders Revision—Report from the Committee.
173. Bills—Court of Chancery, County Palatine of Lancaster.
207. Bills—Convict Prisons (Ireland) (amended).
208. Bills—Criminal Procedure (amended).
210. Bills—Burials beyond the Metropolis.
211. Bills—Sale of Beer, &c.
212. Bills—Medical Graduates (Ireland and Scotland).
198. Bills—Spirits (Ireland).
209. Bills—Standard of Gold and Silver Wares (amended).
216. Bills—Criminal Justice Metropolis) (amended).
214. Bills—Cruelty to Animals—Lords Amendments.
Prisons of Ireland—Thirty-second Report of the Inspectors General.
Turnpike Trusts—Abstract of the General Statements.
Jamaica (Legislative Proceedings)—Papers.
Queen's College, Belfast—Report of the President.

Delivered on 18th July, 1854.

302. (1). Statute Law—Third Report of Mr. Bellenden Ker.
357. Sugar—Account.
380. Aberavon Municipal Charter—Copy of Report.
204. Bills—Piers and Harbours (Scotland) (amended).
213. Bills—Oxford University (as amended by The Lords).
215. Bills—Benefices Augmentation (amended).
217. Bills—Indian Appointments, &c.

Delivered on 19th July, 1854.

376. Metropolitan Sewers—Copy of a Letter.
218. Bills—Stamp Duties (amended).
219. Bills—Returning Officers (amended).
220. Bills—Ecclesiastical Jurisdiction.
221. Bills—Stock-in-Trade Exemption.
224. Bills—Common, &c., Rights (Ordnance).
225. Bills—Mines Taxation (Ireland).
226. Bills—Bleaching, &c. Works.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 14th*, 1854.]

Dated 2nd May, 1854.

979. T. Jackson, Commercial road, Pimlico—Manufacture of paper.

Dated 31st May, 1854.

1210. L. J. Molinos and C. Prounier, Paris—Locomotive steam engines.

Dated 22nd June, 1854.

1366. W. Stidolph, 1, Wintoun place, Greenwich—Book marker.
1368. G. Simpson, 8, Union buildings, Leather lane—Furnaces.
1370. W. H. Brown, Sheffield—Furnaces for melting steel, &c.
1372. A. E. L. Bellford, 16, Castle street, Holborn—Machinery for forging iron. (A communication.)
1374. A. E. L. Bellford, 16, Castle street, Holborn—Grate bars. (A communication.)
1376. A. P. Price, Margate—Alloys of tin.
1378. G. Ermen, Manchester—Winding yarns.

Dated 23rd June, 1854.

1380. C. Phillips, Offchurch—Reaping machinery.
1381. D. C. Knab, Paris—Carburets of hydrogen.
1383. A. E. L. Bellford, 16, Castle street, Holborn—Propelling. (A communication.)
1385. A. E. L. Bellford, 16, Castle street, Holborn—Picking cotton and other fibrous materials preparatory to carding, &c. (A communication.)
1387. J. Weild, Glasgow—Preventing drainage waste of cargoes on shipboard.

1388. J. Keyse, 2, Apollo buildings, Walworth—Loading small arms.
1389. T. J. Dimsdale, Hadley—Gas.
1391. R. Garrett, jun., Leiston works, near Saxmundham—Valves for working steam expansively.

Dated 24th June, 1854.

1393. H. Lightbown, Pendleton—Drying pulp.
1395. R. A. Brooman, 166, Fleet street—Projectile and plug. (A communication.)
1397. R. A. Brooman, 166, Fleet street—Mill for grinding paints, &c. (A communication.)
1399. J. Thomson, Newton le Willows—Sugar manufacture.
1401. R. Bottomley and H. Spencer, Rochdale, and D. Schofield, Oldham—Spinning machinery.

Dated 26th June, 1854.

1403. E. Hubner, Mulhouse—Machinery for preparing wool, &c.
1407. W. Palmer, Sutton street—Candle lamps.
1409. T. H. Bakewell, Leicester—Glass.

Dated 27th June, 1854.

1411. W. Brindley, jun., Moorgate street—Life-boats.
1413. C. H. Collette, 57, Lincoln's inn fields—Beer. (A communication.)
1415. R. A. Antrobus, Birmingham—Printing oil cloth.
1417. C. Iles, Birmingham—Metal bedsteads.
1419. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury—Aerated waters. (A communication.)

Dated 28th June, 1854.

1421. J. Brunlees, Manchester—Drawbridges.
1423. E. Cockshutt, Preston—Bungs.
1425. T. Schlœsing, Paris—Carbonates of soda.

Dated 29th June, 1854.

1427. W. J. Bisseker, Birmingham—Labelling bottles, &c.
1428. C. S. Sperry, Connecticut, U.S.—Knitting machine. (A communication.)
1429. T. Markland, Hyde—Weaving, &c., machinery.
1430. W. Smith and W. B. Hayes, Manchester—Power looms.

Dated 30th June, 1854.

1431. E. J. Hughes, Manchester—Sewing machines. (A communication.)
1432. J. Edwards, Manchester—Railway chairs.
1433. D. T. Shears, Bankside—Curing sugar. (A communication.)
1434. L. F. Izart, 4, South street, Finsbury—Removing organic vegetable substances from woollen fabrics.
1435. W. T. Monzani, 9, St. James's terrace, Blue Anchor road—Folding chairs and stools.
1436. W. Thompson, jun., New York—Steam regulator.
1437. H. G. Gray, Commercial wharf, Mile End road—Preserving potatoes, roots, &c.
1439. T. Slater, Somers place West, and J. Tall, Crawford street, Marylebone—Planes and cutting apparatus.
1440. J. H. Johnson, 47, Lincoln's inn fields—Winding thread. (A communication.)

Dated 1st July, 1854.

1441. R. L. Jones, Chester—Locks and keys.
1442. J. Hulme, Manchester—Steam engines and valves.
1444. J. H. Johnson, 47, Lincoln's inn fields—Submarine navigation. (A communication.)
1445. J. H. Johnson, 47, Lincoln's inn fields—Stoppers for bottles. (A communication.)
1446. G. Hutchison, Glasgow—Soap.
1447. J. Wilder, Reading—Agricultural rollers and clod crushers.

INVENTIONS WITH COMPLETE SPECIFICATION FILED.

1513. P. F. Aerts, Brussels—Railway rolling stock and the lubrication thereof.—11th July, 1854.
1515. T. F. Henley, Brompton—Preparation of colouring materials.—11th July, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed July 14th, 1854.

113. Bevan George Sloper, of London—Improvements in machinery or apparatus for separating gold from earthy matters.
122. Charles Howard, of 4, Trafalgar terrace, Hoxton—Improvements in the manufacture of iron.
127. Joel Spiller, of Battersea—Improvements in measuring and mixing, crushing, grinding, and pulverizing wheat and other substances.
149. John Westerton, of Earl's Court road, Brompton—Improvement in the manufacture of night-light boxes or cases.
170. Peter Armand le Comte de Fontaine Moreau, of 4, South street, Finsbury—Improvements in the preparation and combination of fatty and resinous bodies, and vegetable and other wax for the manufacture of candles; also in the preparation of a wick to be used for the same.
185. Edward Batten Walmsley, of Middle mall, Hammersmith—Improvements in utensils, implements, and apparatus for the purposes of lighting, heating, and cooking.
238. Louis Christian Koeffler, of Rochdale—Improvements in machinery or apparatus for preparing, dressing, and finishing yarns or threads.
239. Louis Christian Koeffler, of Rochdale—Improvements in the method or process of scouring, washing, and oiling wool and other textile materials, for the purpose of spinning, and in the machinery or apparatus connected therewith.
251. William Guest, of Lion square, Sneinton—Improvements in machinery for making whips, parts of which improvements are also applicable to the manufacture of braids and wire nets.
282. Edwards Cole, of Hemmings row—Improvement in the frames of travelling bags.
310. John Dalton, of Hollingworth—Improvements in the construction of bowls or cylinders employed in printing and other processes, and which improvements may also be adapted to other mechanical appliances.
336. Gregory Bird, of Glasgow—Improvements in the sub-structures or foundations of buildings.
568. John Holley Swan, of Glasgow—Improvements in the tuyeres of blast and other furnaces and fires.
610. Albert Wentworth Conner, of 3, Crooked lane, Cannon street—Improvements in the apparatus used for moulding bricks and lumps.
611. John Holley Swan, of Glasgow—Improvements in drying bricks, tiles, and other articles made of brick earth.
786. George Francis Wilson and James Monroe Whiting, of the State of Rhode Island, U.S.—Improvements in the manufacture of wood screws.
964. John Evans, of Abbots Langley—A new manufacture of paper.
1004. William Exall, of Reading—Improvements in machines for cutting straw and other such materials.
1084. John Chedgey, of the Grove, Southwark—Improved manufacture of rollers and cylinders applicable to various kinds of machinery where a smooth, hard, and regular surface is required.

Sealed July 18th, 1854.

135. Charles William Rowley Rickard, of 5, Great Charlotte street, Blackfriars road—Improvements in cocks and taps.
136. Henry Dircks, of 32, Moorgate street—Improvements in safety apparatus, applicable to certain boilers and stills.
148. George Grace and Thomas Francis Jones, both of Birmingham—Improvements in boots and shoes; as also boot and shoe socks or inner soles, whereby the same are rendered waterproof.
153. Peter Spence, of Pendleton, near Manchester—Improvements in manufacturing the prussiates of potash and soda.
156. Andrew Shanks, 6, Robert street, Adelphi—Improvements in machinery for punching and sheering metals.
172. Richard Archibald Brooman, of 166, Fleet street—Improvements in extracting copper from the ore.
202. Alphonso Cajetan de Simencourt, of Paris—Improvements in composing and distributing type.
258. John Dewar Morrison, of Sunderland—Improvements in winches.
320. David Brown, of Smethwick, and John Brown, of West Bromwich—improvement or improvements in the construction and manufacture of axles for railway and other carriages.
392. Benjamin Weston Wells, of Windmill lane, Camberwell—Improvements in printing floor and other cloths.
408. John Ramsbottom, of Longsight, near Manchester—Improvements in welding.
418. John Henry Johnson, of 47, Lincoln's inn fields—Improvements in machinery for making matches. (A communication.)
1006. Edwin Haseler, of Wolverhampton—Improvement or improvements in ornamenting metals, papier maché, horn, and shell.
1056. Josiah Penton and James Mackay, of Chippenham—Improvements in the construction of railway wheels and tyres.
1071. Alfred Vincent Newton, of 66, Chancery lane—Improved mode of separating granular substances of different degrees of fineness.
1085. William Edward Newton, of 66, Chancery lane—Improved machinery for cutting or shaping wood or other materials.
1104. James Horsfall, of Birmingham—Improvement or improvements in the manufacture of wire for pianofortes and other musical instruments.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
July 15.	3616	Sack Holder	Oliver Maggs	Bourton, Dorset.
" 19	3617	Clapp and Fast's Torniquet and Compress for Medical and Surgical purposes in cases of Aneurism, Amputations, and Bleedings, &c.	William John Clapp and George Fast	12, Clifton place, Newport, Monmouthshire. 18, Shaftesbury crescent, Pimlico.
"	3618	Belt Clasp	Alexander Grant, Brothers	Clements court, Wood street.

Journal of the Society of Arts.

FRIDAY, JULY 28, 1854.

PARIS UNIVERSAL EXHIBITION OF 1855.

It will be remembered that Mr. Winkworth was deputed a short time since by the Council to visit Paris, with reference to the Educational Exhibition, and also to bring before the notice of the French authorities the desire of the Society to facilitate the visits of artizans and others to the Paris Exhibition next year.

As one mode of more effectually accomplishing these objects, he was recommended to seek an audience of the Emperor, and having been introduced by H.E. Lord Cowley to M. Fould, Mr. Winkworth, at the instance of the latter, immediately wrote the following letter, which was shown to His Majesty, and resulted in an appointment at St. Cloud:

Hotel de Castille, Paris, June 26th, 1854.

Monsieur le Ministre,—I avail myself of your suggestion to explain in writing the immediate occasion of my visit this morning, with a letter of introduction from His Excellency, Lord Cowley. It was to obtain the gracious consent of H.I.M. to assist the Society of Arts of London in the following objects:

1st. To initiate arrangements for the reception of large numbers of the work-people of England, who, it is expected, will be desirous of visiting the Paris Universal Exhibition of 1855, if means can be found for their accommodation at a moderate expense.

2nd. To receive such introductions to the Directors of Public Schools in Paris, as may enable me to ascertain whether there are any educational appliances sufficiently new and important to be sent to the Exhibition in London, which will be inaugurated by H.R.H. Prince Albert, the President, on the 4th July.

3rd. To suggest to H.I.M. the propriety of a gentleman, conversant with the economy of public instruction being accredited to our Educational Exhibition, for the purpose of conferring with H.R.H. and the Society on all points connected therewith.

On the first of these objects, I have been in communication with Mr. George Clark, of this city, who is already engaged in the establishment of lodging-houses for French artizans, and we have reason to believe that, with Imperial sanction and patronage, all that we have in view may be accomplished.

If, therefore, it should consist with the convenience of H.I.M. to honour us with an audience, we could explain in a few minutes these matters; and this is the more desirable, as it is the opinion of the Council of the Society of Arts (of which I am a member) and of His Excellency Lord Cowley, that the public announcement in the English journals, that at such a reception H.I.M. was pleased to express his desire to promote these objects, the moral effect would be very salutary in my country.

As illustrative of the importance attached to the working man's question, I enclose a copy of the resolution appointing a special committee for the purpose of taking active measures to promote it.

I have the honour to be, &c.,
(Signed) THOMAS WINKWORTH.

Monsieur le Ministre d'Etat.

At this interview, Mr. Winkworth entered very fully into the points above-mentioned, particularly into that which refers to the facilities to be afforded to English workmen to visit Paris next year, in which he was materially assisted by Mr. George Clark, who was able to supply His Majesty with much practical information. The Emperor was pleased to express his hearty approval of the proposition, which he characterised as one of great importance; made some very useful suggestions; and, after alluding to the series of buildings now in course of erection, under the superintendence of Mr. Clark, in the Faubourg St. Antoine, intended for the accommodation of French workpeople, and containing 400 separate apartments, well ventilated and drained, concluded an interesting discussion by remarking that the occupation of them in the first instance by English artizans would be an appropriate inauguration of the buildings. These buildings are to be succeeded by similar establishments in other parts of Paris, on a still more extensive scale. His Majesty then desired Mr. Clark to confer from time to time with M. Fould, who assisted at the audience, on all points connected therewith; and said that Viscount Ebrington, the Chairman of the Committee at the Society, might depend upon such cordial co-operation and assistance as it might be in the power of himself and his government to afford.

Mr. Winkworth was equally successful in the other points which he was instructed to bring before His Majesty's notice,—the presence of M. Milne Edwards in this country, specially deputed to visit and report on the Educational Exhibition, and many of the contributions to the foreign department being the result of his exertions.

Educational Exhibition.

Many articles of considerable novelty and interest, which have recently arrived from France, Holland, Prussia, Belgium, and other foreign countries, are now to be seen in the foreign department, and have been added to the catalogue. Mr. C. F. Audley, of Paris, who has been long and actively engaged in collecting materials for the Exhibition, reports that in addition to the facilities afforded him by M. Fortoul, Ministre de l'Instruction, &c., he has been very successfully assisted by M. Sarrazin the municipal inspector of schools at Paris, and by M. Merruans, to both of whom the best thanks of the friends of education are eminently due.

The Council wish to direct especial attention to the following important declaration:—

We, the undersigned, having in view the very interesting and instructive character of the Educational Exhibition now opened at St. Martin's Hall, in Long-acre, by the

Society for the Encouragement of Arts, Manufactures, and Commerce, commend the same to the attention of all persons professionally or otherwise concerned in education, whether general or special, whether of young persons or of adults, whether of the rich or of the poor.

The Exhibition illustrates the actual condition of education, not only in the United Kingdom and some of the colonies, but also in France, Belgium, Holland, Norway, Sweden, Denmark, Germany, Switzerland, Spain, and the United States; and is highly suggestive of improvements in the modes and means of public and private instruction.

We are desirous that all persons engaged in education, and especially the teachers of normal and elementary schools, should be enabled to profit by the advantages which this Educational Exhibition is calculated to confer upon those who carefully study it; and we invite the civil authorities, ministers of religion, patrons and managers of schools, and all persons of authority and influence, to promote the making of arrangements which may enable scholars, tutors, governesses, schoolmistresses, and others engaged in Education, to resort to London, and to visit the Educational Exhibition before the 31st of August next, when it must necessarily close.

N. Adler, Dr. Chief Rabbi.
T. W. Allies, Secretary Catholic Poor School Committee
Argyll
Matthew Arnold, H.M. Inspector of Schools
Ashburton
Auckland—Bath and Wells
Harry Baber, M.A., Chaplain and Secretary of the Whitelands Training Institution
Edward Baines, President of the Yorkshire Union of Mechanics' Institutes
Thomas Bazley, Manchester
Samuel Best, M.A.
William Bird
William Birley, M.A., H.M. Assistant Inspector of Schools
James Booth, D.C.L., F.R.S.
Joseph Boulden, Parochial School, Clapham
H. G. Bowyer, H.M. Inspector of Workhouse Schools
C. H. Bromby, M.A., Principal of Cheltenham Training School
W. H. Brookfield, H.M. Inspector of Schools
R. W. Browne, M.A, Ph. Doctor, King's College, London
J. B. Cantuar
W. W. Cazalet, General Superintendent Royal Academy of Music
Thomas Challis, Enfield and Finsbury
Robert Chambers, Edinburgh
Harry Chester, Assistant Secretary to the Committee of Council on Education
A. T. Cicestr.
Samuel Clark, M.A., Principal of the National Society's Training College, Battersea
Henry Cole, C.B., Secretary to the Department of Art
Derwent Coleridge, M.A., Principal St. Mark's College, Chelsea
James Cornwell, British and Foreign School Society
Edwin Curwen Collard, (Clerk) Training Institution, Sarum
Maurice Cross, Secretary to Commissioners of National Education in Ireland
John Crossley, British and Foreign School Society
William David, Principal of the Exeter Training College
Richard Dawes, Dean of Hereford
Thomas De la Rue
Warren De la Rue, F.R.S.
C. Wentworth Dilke
Charles J. D'Oyly
William Drake, M.A., Vice President of the Coventry Mechanics' Institution, and Second Master of the Free School
Henry Dunn, Secretary to the British and Foreign School Society
C. L. Eastlake, President of the Royal Academy
Ebrington
Gilbert Elliott, Dean of Bristol
William Ellis, Camberwell
William Ewart, M.P.
J. J. Farnham, Hon. General Secretary Associated Body of Church Schoolmasters
William Farr, M.D.
George Fisher, Chaplain, Greenwich Hospital Schools
William Johnson Fox, M.P.
E. Frankland, Professor, Owen's College, Manchester
James Fulton, Rector of the Normal School, Moray House, Edinburgh
Joseph G. Gent
John D. Glennie, London Diocesan Inspector of Schools
George Godwin, F.R.S.
Peter Graham
Granville
Robert Grosvenor, M.P.
Reginald Gunnery, M.A., Secretary to the Church of England Education Society
Samuel Gurney, jun.
William A. Guy, M.D., King's College, London
H. P. Hamilton, F.R.S., Dean of Salisbury
Harrowby
William Frederick Harrison
B. Waterhouse Hawkins
J. W. Hernaman, H. M. Inspector of Schools
Arthur Hill, Bruce Castle, Tottenham
Frederick Hill, General Post Office
James Hill
George C. Hodgkinson, Principal of Training School, York
Henry Thomas Hope
I. S. Howson, M.A., Principal of the Collegiate Institution, Liverpool
Edward Hughes, F.R.A.S., Head Master of the Royal Naval Lower School, Greenwich Hospital
William Hughes, Training College, Highbury
John Hullah
Joseph Hume, M.P.
Robert Hunt, F.R.S.
William Hutt, M.P.
G. A. Jacob, D.D. Christ's Hospital
Thomas James, Secretary of the Colonial Missionary Society.
H. Longueville Jones, H.M. Inspector of Schools
W. J. Kennedy, H. M. Inspector of Schools
Lansdowne
Charles Lemon, Bart.
John Lindley, F.R.S.
William Linton
John Lincoln
C. J. London
John G. Lonsdale, Secretary of the National Society
W. G. Lumley, Gwydir House and Council Office
Henry C. Lunn, R. Academy of Music
Henry Mackenzie, Vicar of St. Martin's in the Fields
J. R. Major, D.D., King's College School
Horace Mann
M. Marshall, Bank of England
F. S. Marshall
John Menet, M.A., Chaplain of Hockerill Training School
Herman Merivale
M. Mitchell, H.M. Inspector of Schools
D. Middleton, H. M. A. Inspector of Schools in Scotland
G. Van de Linde Monteuuis, College Français, Highgate
J. D. Morell, H.M. Inspector of Schools
S. Morley
Henry Moseley, F.R.S., Canon of Bristol, and H.M. Inspector of Schools
C. G. Nicolay, Deputy Chairman of Queen's College, London
J. P. Norris, H.M. Inspector of Schools
Hugh Owen, Poor Law Board

Matthew Parrington, Principal of Training College, Chichester
C. W. Pasley, Lieut.-General, R.E.
E. Perry, M.P.
S. Morton Peto, M.P.
Thomas Phillips, Honorary Secretary Welsh Education Committee
Wyndham Spencer Portal
T. G. Portlock, Lieut.-Colonel R.E., F.R.S. Inspector of Studies, Royal Military Academy, Woolwich
Boden Powell, F.R.S.
Cipriani Potter, Principal of the Royal Academy of Music, London
A. Bath Power, M.A., Principal of Norwich Diocesan Training Institution
A. G. Ram, M.A., Vicar of West Ham
John William Ramsden, Bart., M.P.
Samuel Redgrave
James M. Rendel
John S. Reynolds, Honorary Secretary to the Home and Colonial School Society
George Croke Rowden, D.C.L., Clerk, Principal of Temple Grove School, East Sheen, formerly Fellow of New College, Oxford
C. Richson, M.A., Cathedral, Manchester
Arthur Rigg, Principal of Normal School, Chester
J. C. Robinson
A. Roche
William Rogers, M.A , St. Thomas Charter House
Joshua Ruddock, H. M. Inspector of Schools
J. Russell, M.P., Lord President of the Council
Francis R. Sandford, Assistant Secretary to the Committee of Council on Education
W. Wilson Saunders, F.R.S.
Benjamin Scott, Secretary Working Men's Educational Union
John Scott
John Sinclair, Treasurer of National Society, and Archdeacon of Middlesex
Philip Smith, Head Master of Mill Hill School
Thomas Sopwith, F.R.S.
Stanley, M.P.
D. J. Stewart, H. M. Inspector of Schools
Scott Nasmyth Stokes, H. M. Inspector of Schools
David Stow, Honorary Secretary, Glasgow Normal Seminary
Henry Cuttill Stubbs, Clerical Principal of Clergy and Training School, Warrington
W. H. Sykes, F.R.S.
Jelinger Symons, H. M. Inspector of Schools
E. Douglas Tinlin, H. M. Inspector of Schools
William Tooke, F.R.S.
Richard C. Trench, M.A.
E. Carleton Tufnell, H. M. Inspector of Schools
T. Twining, Jun.
William J. Unwin, M.A., Principal of Homerton College
Thomas Vowler St. Asaph
Jacob Waley, M.A., Professor of Political Economy, University College, London
George Wallis, Birmingham School of Art
William Warburton, H.M. Inspector of Schools
Frederick Watkins, H.M. Inspector of Schools
William H. Watson, Sunday School Union
Thomas Wilkinson, H.M. Inspector of Schools
A. Wilson, M.A., Principal of Westminster Training Institution
George F. Wilson
John Wilson, F.R.S.E., &c.
R. Wilson, D.D., F.C.P., Dean of the College of Preceptors
Thomas Winkworth
C. Winton
Ed. Woodford
Ralph N. Wornum, Marlborough House
Manuel de Ysasi

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £1021 11s. 6d., including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

ELEVENTH LIST.

	£.	s.	d.
Robert Forster	2	0	0
A. J. Hewett	0	10	6
John Litchfield	3	0	0
Henry Pollock	1	1	0
The Rt. Hon. Edward Strutt, M.P.	5	0	0

ABSTRACTS OF LECTURES, PAPERS, AND DISCUSSIONS.

THURSDAY, JULY 20TH, at 3 p.m.

ON MODERN DISCOVERIES BY THE MICROSCOPE. BY T. RYMER JONES, F.R.S., PROFESSOR OF COMPARATIVE ANATOMY, KING'S COLLEGE, LONDON.

Professor Rymer Jones observed that it had seldom been his privilege to witness a scene calculated more impressively to show the importance attached in these days to the efficient education of youth than that with which he was surrounded on the present occasion; and whether he cast his eyes around those spacious halls, fitted as they were with every appliance whereby the truths of philosophy can be most conveniently inculcated, or upon the numerous and important audience he had the pleasure of addressing, animated as they were with one desire to aid in the great cause of educational advancement, it was impossible not to perceive how earnestly they had set about their pleasurable task; it was impossible not to feel that when, in the course of a short time, the means thus placed at the disposal of our schools were distributed throughout our land, results of immeasurable importance might fairly be anticipated. A new and striking feature in the educational system of the present day is the practical character of the instruction afforded in our schools by substituting personal observation in the place of dogmatical teaching, thus affording a broad and solid foundation whereon to build the mental fabric, instead of the flimsy substratum too generally supplied. It is easy to teach any charity child to sing about

> "The spacious firmament on high,
> And all the blue ethereal sky,"

without exciting any very distinct or definite ideas relative to the awful truths revealed by astronomical science; but it is the use of the telescope alone that can adequately impress upon the mind the grand realities of the celestial spheres. It is easy for any one to expatiate generally concerning the extent of the animal creation, and the limitless beneficence of Providence, but it is the microscopist only, who, reversing the Galilean tube, explores for himself the deep abysses of a drop of water, and finds therein a world invisible to the unassisted sense, feelingly can appreciate the works of the Almighty.

Not many years ago it was related that the inhabitants of a certain district in Sweden, possessing but a scanty stock of corn, were in the habit of mixing with their meal a portion of the earth of the country to supply the defi-

ciency, and that this earth was found to be nutritious. Now it had long been an acknowledged fact that animal life cannot be sustained by inorganic matter; but how, then, in this case could such be employed as nutriment? Many microscopes were speedily directed to this inquiry, and on examination, to the astonishment of an admiring world, this earth was found entirely to consist of shells of microscopic creatures, shells as perfect in their construction as they were varied in their beauty. Such a circumstance as this was eminently calculated to attract the attention of the curious, and subsequent investigations were not long in proving the startling fact that whole tracts of country in different parts of the world—nay, solid rocks—are altogether formed of similar materials.

A coin shows by the impress upon it the name and date of the sovereign in whose reign it was issued, so do these "medals of creation" bear testimony to the eternal power and sovereignty of the Great Ruler of the world. Nearly 6000 years passed away before the invention of the microscope. Poetry had sought to pourtray the "flammantia mœnia mundi,"—it remained for the microscope to bring them before our view. Looking with the ordinary powers of the microscope into a drop of water, we perceive minute globes rolling round and round, having within them smaller globules revolving like satellites, not around, but within their parent planet. Multitudes of various forms have been found; and Ehrenberg, who had given much time and profound attention to the examination of these forms of being, has supposed them to be possessed of numerous stomachs, an eye, and a system of blood-vessels; but sober reflection and more recent investigation have assured us that these do not exist. The interior globules, supposed by him to be stomachs, at the touch of the magic wand of a sister science, have revealed their real nature; tested by iodine, they have shown themselves to be starch granules; and these infusoria, so long claimed as part of the animal creation, are now given up to the botanist as belonging to the vegetable world.

In his younger days he was told of a mill to grind old people young again, and laughed heartily at so absurd a story, little thinking that a greater number of years, more knowledge and mature reflection, would convince him of the truth of the tale as regards these infusoria, in whom division is multiplication; looking at one of these you will perceive a transparent line crossing it; sometimes longitudinally, sometimes transversely, sometimes obliquely, according to the different species. At each extremity of the line an indentation may next be observed, which gradually lengthens till the two halves resemble the two continents of America connected by a slender isthmus; by the continued efforts of both portions they become finally divided, and each swims off to find for itself a separate maintenance. In 24 hours a transparent line appears across each of these divided beings, and a similar division again takes place. We have heard of the calculation of the nail in a horseshoe and the squares on a chess-board, but these are trifles compared with the computation of the descendants of a single monad, which in one month would equal the number of the human inhabitants of this globe. A grain of sand appears of little importance, but the shores which say to the ocean "hither shalt thou go and no further, and here shall thy proud waves be stayed," are but composed of multitudes of these grains; so these myriads of simple forms oppose a barrier to chaos and to death, and retain within appointed bounds all that may contribute to organic existence. These infusoria form the base of that pyramid of animal life at the apex of which man has proudly stood for 6000 years without discerning that foundation to which it owed its strength and its security. The microscope is a most valuable instrument for education and for amusement; costly apparatus is not needful, nor is great advance in science necessary to the person who uses it; the most important observations have been made by the most simple means. Many of the discoveries of Ehrenberg himself were made by means of a simple pocket-instrument. The microscope is available at every leisure hour; it affords quiet and never-ending amusement, and not amusement only, but the most important of all instruction, for it affords us visible proof that God not only clothes the "lilies of the field," and the grass which to-day is, and to-morrow is cast into the oven, but that He perpetually cares for these myriad of creatures, so small that they are invisible to the unaided sight; and how, then, shall we, so much more highly favoured, ever fail to rely upon His fatherly Providence and His unwearying care?

FRIDAY, JULY 21st, at 5 p.m.

ON THE CONNECTION OF PHYSICS AND CHEMISTRY WITH OTHER BRANCHES OF KNOWLEDGE. BY ALEXANDER WILLIAMSON, OF UNIVERSITY COLLEGE.

The object of this discourse was to prove that the study of the physical sciences is well adapted to become part of every general education, and to show the position it would occupy in a general plan of education. The expression "general education," was used to denote the education of all classes of society, and especially of the poorest, which stand most in need of it. The lecturer referred to the acknowledged importance of giving education to the people, and the impossibility of raising and improving their condition without doing so. The objects of education were described as twofold. 1st. To direct the thoughts and feelings into good and useful channels, by developing a sense of duty at the expense of egotism, and teaching to sympathise with the best aspirations of humanity. 2nd. It should teach to judge correctly of such questions as occupy the attention, and to apply the conclusions to the benefit of one's fellow-men. After alluding to the insufficiency of word-learning for these purposes, the lecturer mentioned an idea which has gained ground among some persons in this country, that education of the people should impart practical proficiency in the mechanical arts; in opposition to which he argued that no preparatory exercise in any art could be equal to the practice of it in the workshop, but that education should give such general training as would be useful for any pursuit, and develope those faculties and habits of the mind which are useful in any career. He argued that it is necessary to teach the duties to society as well as the duties of private life; for even the humblest individuals will occupy themselves with a consideration of the rights of masters and servants, and often arrive at very erroneous conclusions on the subject, and even try to put them in practice, all for want of a little sound knowledge of the subject.

A consideration of the history of the sciences shows, that the human mind, in its most successful exertions, has followed a certain definite law of progression, beginning with the systematization of the simplest of notions, such as those contained in arithmetic and geometry, and rising gradually to more complex and difficult subjects, each step serving to prepare for the next. The same principle must be observed in education, which must be so planned that each step may be perfectly understood at the time it is taught, involving only a knowledge of those which have gone before it in the series. A deviation from this principle will generally entail evil consequences, by giving the habit of remaining satisfied with mere parrot knowledge.

Brief allusion was made to the difference between a science and a mere collection of facts, which was compared to the difference between education and mere instruction. The general object of the physical sciences was described, and it was shown that whereas physics treat of the properties of matter, chemistry has to explain the changes which those properties undergo by the mutual action of different substances. Chemistry is, therefore, physical dynamics. Inasmuch as the physical sciences combine the exercise of the reasoning faculties and the faculty of observation, their study must be preceded by that of some science in which one alone of these faculties will be called into play. Now we can reason without observing,

but we cannot observe without some exertion, however small, of the reasoning faculties. Mathematics exercise and require the reasoning powers alone, and the study of at least their most elementary notions must accordingly precede that of the physical sciences. But mathematical, or any other purely formal science, does not teach the investigation of truth; like logic, it shows how to find the consequences of propositions whether true or false. Every practical application of human reason involves no doubt some exercise of the deductive faculties, but it involves also the power of estimating at their true value facts for which no deductive evidence can be obtained.

It is quite as important, and probably quite as difficult, for the decision of a given question, to select judiciously the facts on which to reason, as to reason upon them when once selected, and the formal sciences (mathematics and logic) cannot help one in the selection.

The lecturer argued that for this purpose the best process, and the one practically resorted to by the human mind for judging of stated matters of fact which are beyond the reach of deductive evidence, is to compare them with others well-known and proved. Hence the importance of storing the mind with simple and well-digested facts, which may serve in cases of difficulty as samples of what natural truths are like. These are to be best obtained in the physical sciences, which present explanations of the simplest and best known facts of nature, and those best calculated to serve as a foundation of a sound knowledge of her laws and processes. The physical sciences treat, moreover, of common things, concerning which most persons are liable, in the absence of instruction, to form erroneous notions, which, once stored up in the mind, become guides to error, just as truth is a guide to the discovery of new truths. Various other mental and material advantages were described, which would result from the general dissemination of a knowledge of the principles of the physical sciences, and the lecturer expressed his conviction that they are destined to be taught to some extent even in the most elementary of popular schools—and that it would not be difficult to do much towards that result in the present state of public instruction.

FRIDAY, JULY 21st, at 8 p.m.

ON THE STUDY OF NATURAL HISTORY, CONSIDERED AS A BRANCH OF EDUCATION. BY WILLIAM B. CARPENTER, M.D., F.R.S.

After stating it to be his conviction, that all sound education should aim at the formation of a taste for pursuits, which, while wholesome and beneficial in themselves, should also be sources of pleasure, and therefore should attract the individual from tastes and habits of a lower character, Dr. Carpenter showed how deeply-rooted in our stitution is sympathy with Nature, and especially with Animated Nature, and in how great a variety of modes this sympathy may be called out, so as to adapt the study of Natural History to minds of every grade of cultivation and of the most diverse tendencies in other respects.

Considering it, then, as an instrument of *Intellectual* education, he pointed out its great value as a means of training the *observing* powers, and of forming habits of accurate description; more especially dwelling on the importance of learning to separate the *inferences* which the mind almost unconsciously forms, from the *facts* actually observed, which are often misrepresented under the influence of preconceived impressions. The disregard of this distinction is a most fertile source of error and confusion in the ordinary business of life, as well as in almost every department of science. This education of the observing powers by means of Natural History, may be prosecuted under every variety of condition, different modes being adopted according to circumstances, and it may be advantageously commenced at a very early period of life. Dr. Carpenter particularly referred to the Microscope, as furnishing most efficient aid, especially to the dwellers in large towns, cut off from more than an occasional excursion to the fields or woods; and suggested that the Society of Arts might advantageously promote the production of a cheap educational microscope, of a far better kind than any of the low-priced instruments at present in use. He then showed that the powers of comparison, abstraction, generalization, in fact *all the reasoning faculties*, find their appropriate exercise in the various departments of this study, which has occupied some of the greatest minds in every age; and he urged that it possesses this great advantage, when pursued in connection with more exact sciences, or with branches of knowledge which are essentially non-progressive, that, from its very nature and condition, its facts being continually multiplied and made more precise, and its doctrines being continually modified and rendered more comprehensive, the study of it tends to prevent the intellect from placing too much reliance on its own beliefs, and to foster that candid and discriminating appreciation of what is new to it, which is the basis of all sound progress.

In conclusion, Dr. Carpenter adverted briefly to the *poetic*, the *moral*, and the *religious* bearings of this study; and expressed his strong conviction that, by judicious guidance, it might be made to act beneficially on a larger proportion of man's faculties, than any other *single* object of pursuit.

SATURDAY, JULY 22nd, at 5 p.m.

ON THE RELATION OF PHYSIOLOGICAL SCIENCE TO OTHER BRANCHES OF KNOWLEDGE. BY THOMAS HUXLEY, F.R.S.

Taking physiological science in its widest sense, as the equivalent of biology—the science of individual life—the lecturer proposed to consider in succession, 1st. Its position and scope as a branch of knowledge; 2nd. Its value as a means of mental discipline; 3rd. Its worth as practical information; and 4th. At what period it may best be made a branch of education.

1. The subject matter of physiological science differs from that of the mathematical and physico-chemical sciences, inasmuch as rest is the normal state of the objects with which the two latter are concerned, while, on the other hand, incessant cyclical change is the essence of living bodies. Tendency to equilibrium of force and to permanency of form, is the character of that portion of the universe which does not live; tendency to disturbance of existing equilibrium and to the assumption of forms which succeed one another in definite order, is the character of all living beings whatsoever; and for the present we may take this distinction as an ultimate fact.

Now does this difference in subject-matter imply that difference of method which is so often assumed?

The lecturer said that for his own part he was unable to discover any real difference between the methods of science and those of ordinary life. Science is nothing but *trained and organized common sense*, and its great results are obtained by methods identical in nature with those by which the most ordinary and trivial business is carried on. But if this be true, it would seem highly improbable that any real difference should exist between the methods of different sciences.

The lecturer next considered in detail the points in which the methods of physiological science are said to differ from those of the mathematical and physico-chemical sciences. The fallacies involved in the application of the term "inexact" to physiological science; in the assertion that it is especially characterised by the use of the "comparative" method—comparison being, on the contrary, the first step in all sciences—were pointed out. Particular attention was directed to the extreme incorrectness of the doctrine that the physiological sciences are not "experimental," inasmuch as there is not a single fact of any importance in physiology which has been established otherwise than by experiment. And, finally, the supposed distinction between natural history classification and other classification—viz., that biological classes are based on type and not on definition—was shown to be the result of confounding a transitory, imperfect state of

biological classification with its essential condition. The lecturer particularly brought forward illustrative cases to show that all scientific natural history classification is, on the contrary, based on definition, and not on type.

Biology, then, is at one with all other sciences, so far as its methods are concerned; and these methods are—*Observation* and *Experiment; Classification* and *Generalisation; Deduction* and *Verification*. The lecturer illustrated their application by going through the process by which the doctrine of the circulation of the blood is established, and he took occasion more particularly to insist upon and illustrate the great importance of verification.

While, however, insisting thus strongly upon the general identity of biological methods with those of other sciences, the lecturer explained that particular portions of these methods, viz., Observation, Experiment, Comparison, and Classification, are much more prominently brought into play in biology than elsewhere, and that therefore this science affords far more abundant means of training the faculties in these directions than any other. Hence its disciplinal value.

After showing the peculiarly central position of biology, midway between the mathematical and physico-chemical sciences on the one hand, and the social and political sciences on the other, the lecturer turned to its practical application, and after pointing out the lamentable results to which their profound ignorance as to the simplest points of the structure and working of their own frames, lead even the most highly-educated classes of this country, he indicated the moral bearings of the science,—the influence which a knowledge of the distribution of pleasures and pains among even the most despised of the lower animals, might have upon our conception of the divine government; and then, passing to the æsthetic side of the question, he showed how this ignorance of natural science hinders men from seeking out the most abundant of all sources of those pleasures which are derivable from beauty.

Finally, in considering the period at which the teaching of physiological science might best be commenced, the lecturer said, that while no age was too young for the ready and interested reception of the common facts of biology, it was questionable if its systematic teaching could be commenced with advantage before the student was in possession of a considerable amount of physical and chemical information.

SATURDAY, JULY 22ND, at 8 p.m.

ON THE USE OF COMMON-PLACE BOOKS IN SELF-EDUCATION. BY WILLIAM A. GUY, M.B. CANTAB., F.S.S.

The lecturer prefaced his description of his own plan of common-place book by stating that a subject which had engaged the serious attention of John Locke, who had himself invented and described a common-place book, could not but be deserving of the notice of his audience. He went on to observe that his subject was one of universal interest, for there was no man, whatever his calling or profession, who did not find it necessary to commit to writing the knowledge which he obtained by observation, conversation, and reading. The statesman, the lawyer, the physician, the clergyman, and even the literateur and miscellaneous writer, must adopt some orderly plan for committing to writing, and in a form admitting of being readily referred to, the subjects which they found to be important or interesting. Even the author of Hudibras, if we may trust to the statement of Dr. Johnson, made use of a common-place book. The term "common-place book" was, perhaps, calculated to mislead; but there was no analogy between a common-place *book* and a common-place *person*. The book might contain a rare collection of important facts, ingenious hypotheses, sound theories, happy thoughts, graceful expressions, and brilliant fancies. Dr. Guy then proceeded to give a short account of Locke's system of common-place book. He stated that it was a book from the very first, and not, as was the system he himself advocated, a collection of loose papers gradually built up into a book. After describing Locke's mode of entering his quotations in the body of the book, and the mode of constructing and using the index, the lecturer expressed surprise that such a man as John Locke should have adopted so very artificial a plan,—a plan which held together passages referring to the most opposite subjects, by the artificial tie of a common initial letter, and a common first vowel. *Todd's Index Rerum*, was open to the same objection, and neither it, nor Locke's common-place book, nor any other analogous method could be said to be of any service in self-education. In using these methods there was no necessity for any other exercise of the mind than that which was required to determine the initial letter and first vowel of some leading word which would prove suggestive of the quotation or other entry of which the owner of a common-place book might happen to be in search, and thus enable him to turn to it. Dr. Guy then proceeded to describe his own plan. He represented it to be one which required at every stage of the process by which the loose leaves were built up into a book, the exercise of the mind in a useful work of analysis. The *loose leaves*, which are all of the same size, are ruled with horizontal lines at the top, and a series of vertical lines beginning at the left-hand border. The first vertical line rules off a blank space for the spring by which the loose pages and index are at last to be made up into a book. The second vertical line creates a narrow column in which to write a summary of the contents of the passage to be entered. The third vertical line creates a very narrow column for figures of reference, and the rest of the page is given up to the entries to be made. The horizontal lines are for the following purpose: on the upper line, at the right-hand corner of the page, the *subject* is written; on the second line, the *subdivision* of the subject; and on the third line, the very *proposition* which the entries are intended to illustrate. This page, and, if necessary, others in succession, are devoted to this one proposition, and to this alone. This loose leaf is placed in a portfolio of folded paper, on the outside of which the subject is written, and so with other leaves containing matter referring to the same subject. When these leaves increase so as to require to be subdivided, they are divided among like portfolios of folded paper, bearing on the outside the subject and subdivision of the subject inscribed on the loose leaves which they are to contain. These portfolios are kept in a drawer. When they have become numerous, they are themselves placed in a portfolio of stiffer paper, with the subject written or printed outside of it; they are then at any time ready to be made up into a book. This is done by taking as many index papers, bearing each a printed index letter of the alphabet, as there are portfolios, and placing before each index paper, and between it and its predecessor, the contents of one of the portfolios. In this manner the space between one index paper and another becomes virtually a portfolio. All that is now required is a table of contents of the size of the index papers, less the projection bearing the index letter, and inscribed with a table of contents, and a column of small index letters. All these papers having been brought together are placed in a portfolio with a large flexible back, and held together by a spring grasping the back. In using the common-place book thus built up, we turn to the table of reference and subdivision of the subject to which the book is devoted, and the letter opposite to that subdivision refers us to the index page, before which all the entries referring to that subdivision are arranged. Dr. Guy illustrated his lecture by examples, and referred to the "Quarterly Journal of the Statistical Society" for January 1841, for his original account of his plan of Common-Place Book.

MONDAY, JULY 24th, at 5 p.m.

ON THE INFLUENCE OF EXAMINATION AS AN INSTRUMENT OF EDUCATION. BY THE REV. JAMES BOOTH, D.C.L., F.R.S., &c.

After expressing the belief that the Educational Exhibition will mark an era in the progress of national education in this country, the lecturer expressed the hope that the collection should not be forced to share the doom of its great predecessor, and be resolved again, a few weeks hence, into its constituent elements. But having said thus much, he added, that educational apparatus, after all, was but the dry bones of education. There are only two ways by which a real advancement can be secured, by providing an adequate supply of well-trained teachers, and by giving to the pupils sufficient motives for exertion; of these two the latter is by far the more important element. Now a system of general examination would be the most powerful instrument we could employ to promote a truly national education, and it would enable us to elude the religious difficulty which on all sides besets and hampers us. This is the principle on which our Universities, without any external supervision or control, continue to provide an admirable training for the minds of those committed to their charge. But it is not in the Universities alone that examination is used as an instrument to promote education. In the learned professions, as they are called, in the East India Company's service, military and civil, in the royal navy, and lately in the army and in our commercial marine, examination has been used as the great instrument for promoting and testing proficiency in the acquisition of knowledge. But by far the most important move in this direction, is the proposal on the part of the government—which was formally recommended in the speech from the throne, at the commencement of the present session,—to throw open to public competition the appointments which are now the private patronage of the ministers of the crown, a measure which has been ably advocated by its great promoters, Sir Charles Trevelyan and Sir Stafford Northcote. It is remarkable that this self-denying ordinance of the government, this proposal to denude itself of patronage for the benefit of the public, has been received with coldness by that very public for whose benefit it was proposed. The Duke of Argyll and Earl Granville have ably defended the measure against the attacks of professing friends of education, while a portion of the press, to which the *Times* is an honourable exception, which boasts itself the friend of progress and the advocate of reform, argues against it on principles which, if admitted, would prove that ignorance is the very best qualification a man can have for the efficient discharge of public duties.

Some six or seven years ago the lecturer wrote a pamphlet, which he published under the title "Examination the Province of the State,"* in which he gave the outline of a system, very similar in principle to that which is now recommended to the Mechanics' Institutions of the country by the Council of the Society of Arts. The plan was somewhat as follows:—Let the Government establish a rule, or let the legislature, if necessary, enact a law, that no person after the year —— shall be admitted to any employment under the crown, or be eligible to discharge the duties of any public official appointment, who shall not either have taken a degree in some University of the United Kingdom, or passed through one of the Military Colleges, or obtained a certificate from the Board of Examiners, hereafter referred to. Let such a certificate have the effect of placing the holder in the class from which all official appointments must necessarily be filled, but not to give a claim to such appointments as a matter of right. This rule being established, let us further suppose the whole country to be divided into districts, or educational circuits, of such extent as the state of education and the amount of population might require; and that a Board of Examiners were appointed by the crown, who should hold in each circuit an annual examination of candidates, in courses of subjects by them previously appointed. At this examination all persons should be permitted to present themselves, no matter where educated. This Board should be empowered to issue to successful candidates certificates of three classes. The third-class certificate to be awarded to those who should show that they had a fair average acquaintance with the subjects set down for the ordinary examination. The second-class to be conferred only on those whose answering should be of high order; while the first-class certificate should be reserved for those who, in addition to the knowledge and answering which would qualify them to obtain the second-class certificate, should undergo a voluntary examination in the higher departments of some course of literature or science (to be selected by themselves under certain obvious restrictions,) and who should prove their knowledge to be extensive and accurate. The Board of Examiners should publish, in a cheap form, or sanction the publication of, an Educational Gazette, which should contain accounts of their proceedings, of the examinations that had recently been held, and which should give the names of the successful candidates, the class of certifiate adjudged, their residences, the schools at which they had been educated, the number of those who presented themselves for examination, and the number rejected. It should be moreover an established rule, that no examiner inspect or visit officially any school. Their duties should be strictly limited to examine such candidates as should voluntarily present themselves for examination and to award the proper certificates. A sum should be charged for each certificate. To issue them free of charge would be injudicious. Men seldom much value that which costs them nothing. These are the bare outlines of a plan that would require very little preliminary organisation; no capital to be expended in costly structures or in architectural decorations. It would interfere in no way with the present schoolmasters. Treating Churchman and Dissenter alike, it would calm down religious animosity; while it would carefully provide that the duties of religion should be inculcated by all sects, it would not meddle with the doctrines of any. There would be no grounds for the separation of religious from secular instruction. Both being left in the hands of the people themselves, their union might be secured with the utmost safety. No candidate, however, should be permitted to present himself for examination without producing a certificate from his clergyman or other religious teacher, testifying to his moral character and religious knowledge. This plan would not interfere with any established functionary, nor supplant any local authority, nor deprive any corporate body of their rights. Self-supporting, it would elevate the condition of the middle and lower classes to a degree of which we can scarcely form an adequate conception; and, finally, it seems less open to grave objection than almost any other practicable one which could be devised. It would be difficult to propose, for the promotion of education, any scheme, even of the most meagre kind, which would interfere so little with prejudices or with voluntary exertion. The result of such a system would be that in a short time we should see the youth of the middle, and, to a great extent, of the poorer classes too, with minds well stored, and with intellects developed, taught to rely on their own energies, and, diverging from this point as from a common centre, bearing with them into their new pursuits that steadiness of application, that force of will, that facility in turning the well-trained faculties of the mind on an untried subject which previous exercise of the understanding and habits of patient study can alone bestow.

* Examination the Province of the State, or the Outlines of a Practical System for the Extension of National Education. By the Rev. J. Booth, LL.D., F.R.S., &c., Chaplain to the Marquis of Lansdowne, and President of the Literary and Philosophical Society of Liverpool. London: J. Parker, West Strand. 8vo., 74p., 2s.

The lecturer then referred to the Report of the Committee of the Society of Arts on Industrial Instruction,* in which the question of examination was discussed at length, and the strength of public opinion in its favour shown.

But there are those who will say, such a measure as you advocate would lead to very great and important changes in the social and moral aspects of the country. We freely admit the charge. They would lead to such, unquestionably. But change is the condition of the life of every organised being. To cease to change is to cease to live. It is no less so of the life of a nation. Contrast the United States of America with the worn-out empires of the East, which have long since passed away. The restlessness of the ocean does not affect its stability. It is the condition of life for all within its bosom. Changes like those we advocate are but the developments of a healthy growth, and of a progress upwards to a long maturity. Change is life; sameness is death. That unchanging aspect of national institutions which has been sometimes lauded, is almost always to be deprecated; for time has shown that reform does not imply subversion, and that long unchecked decay does not admit of conservative renovation. Moreover, when an institution lives in the heart of a nation, the parasitical support of protective laws checks its development, and cramps it growth. We trust, then, in the onward progress of legislation, and that as our people increase in knowledge they will also grow in wisdom, and that these plied together will be the strength and the stay of a hope of better things to come, and of the stability of the present.

Monday, July 24th, at 8 p.m.

On Music as an Element of Education. By John Hullah.

The lecturer commenced by adverting to the difficulties in making the subject of his lecture attractive, yet he believed it was far easier than it was fourteen or fifteen years ago, when it first fell to his lot to take a share in performing it. For, though much remained to be done, several of those objections which stood in the way of any general diffusion of musical knowledge, had been annihilated by fair discussion, or had died out from want of vitality. It was objected at one time that skill in vocal music was very likely—not to say certain—to lead those who acquired it into dissipation, and to promote habits of intemperance; at all events, that in the case of the working classes learning to sing, and singing, would distract their attention from those avocations to which they must look for their daily bread. It was objected, half a century earlier, that the power of *reading* would enable persons of the same class to read 'bad' books; and the power of writing to commit forgery. Experience has exploded this fallacy. A general impression, however, still prevails, that every department of the Fine Arts is not so much a subject for intellectual exercise, wherein a reasonable amount of appliation will ensure a reasonable amount of success, as a matter in which application goes for nothing at all. That certain persons show a greater aptitude for certain artistic pursuits—a quick ear or a correct eye, for instance—and that such persons will learn to sing or to draw apparently with more ease than others, no one will deny. But if it be implied that such inequality in organization is so great and so common, that some men can do without the least trouble that which any large number could never do at all—in any degree, or with any reasonable amount of application—then the lecturer protested against such a doctrine, which would put an end to all education whatever. It is no more true of music or of drawing than of grammar or arithmetic. It would be as idle to deprive a child of air, exercise, and wholesome food, because it was born into the world with a delicate frame, as to condemn his ear or his voice, his eye or his head to remain unexercised, because he *manifested* no genius for music and drawing. Those who, believing in the possibility, doubt the propriety of making music an element of education, generally justify their opposition by one or other of these two propositions, or, incredible as it may appear, by both of them.

1. That music is a mere accomplishment.
2. That it is so difficult, as to take from other studies an amount of time and attention which cannot be spared from them.

These two propositions would seem to have a very considerable tendency, if left to themselves, to destroy one another.

Education, or training, may be classed under two heads—the one direct, or professional; the other indirect, or unprofessional. And these two kinds of education, or training, are not peculiar to any particular rank of society; their operation may be traced no less in the lowest class of the parochial school than the highest of Eton or Winchester. No education is exclusively and entirely *direct* or professional; and, indeed, so strong is the feeling the other way in this country that the training, which he had called *in*direct, has been recognised, time immemorial, by the honourable designation a *liberal* education. We no more teach anatomy to a schoolboy, whom it is our fixed resolve to train eventually as a surgeon, than we teach plastering to a schoolboy who, a thousand to one, will have to earn his bread as a plasterer. In spite of all the efforts of those worthy but most unloveable people who call themselves *practical* men, a larger and nobler view of our duties to our children has prevailed, and will prevail among us; and we are pretty generally agreed that before we begin the professional superstructure, and rear our lawyer, physician, baker, or bricklayer, we must spare a few years for the non-professional foundation—to the rearing of the kind, truthful, and intelligent *man*.

The lecturer, after stating that experience seemed to show that of all agents of mental discipline the most effective was the grammar of a foreign language, observed that in his opinion almost everything that could be said in favour of language, either as a means or an end of education, could be said with equal justice of music.

By the attainment of any single tongue (in the common sense of the word) we put ourselves in communion with the people of but *one* country, and perhaps of but one age. But music, while it possesses a grammar as interesting and as philosophical as that of any other means for expressing thought, has a history which takes in, and a literature which has been formed by, the contributions of *every* people and of every age.

The value of music as an instrument of mental discipline was then noticed, and the difficulty of one process of musical training—that of reading from a full score—was pointed out.

In a great piece of concerted music there are brought into requisition at least four kinds of voices, the soprano, the contralto, the tenor, and the bass, and at least twelve different kinds of instruments; the violin, viola, violoncello, doublebass; the flute, oboe, clarinet, bassoon, horn, trumpet, trombone, and drum. Of these voices and instruments the numbers vary considerably. In a large orchestra there are usually upwards of twenty-four violins, eight tenors, and about nine violoncellos and nine double-basses. The flutes, oboes, clarinets and bassoons, rarely number more than two each. Of the horns, there are commonly four; of the trumpets, two; of the trombones, three.

That succession of sounds which each voice or set of voices, instrument or set of instruments, performs, is called a *part*. Each set of voices has its own part, (soprano, alto, tenor, and bass), and these are frequently further divided, making six or even eight voice parts. Of the instruments,

* The Report of the Committee appointed by the Council of the Society of Arts to inquire into the subject of Industrial Instruction; with the Evidence on which the Report is founded. Published under the sanction of the Council of the Society of Arts. London: Longman & Co. 8vo., 5s. 1853.

the violins are commonly distributed into two sets, (1st. and 2nd); as are the violas sometimes; consequently, there will often be six parts for the stringed instruments alone. Every one of the wind instruments has a separate part; which gives us in addition seventeen parts more. To these are frequently added solo parts entirely distinct from those of the chorus or the orchestral instruments: to the number of these there is no limit but the will of the composer. Now in a full score, all these parts, which often amount to thirty, are collected together and placed most of them on separate staves, over one another, that they may be presented at once to the eye of a *reader*, as they are presented at once, when performed, to the ear of a listener. Everybody would feel and understand that to read any symbols which in proportion to letters are as a page to a line, cannot be an easy process. But this is a very small part of the musical reader's difficulty: for the same symbols have many different powers; the same note by no means stands on all the staves for the same sound.

To explain why this is, and of necessity must be so, would take him more time than he had to spare: but an example of the fact will be intelligible even to those who are not musicians. The note which represents the sound *la*, or A, in the parts for the violins, the flutes, and the oboes, represents *si* in the viola part, sometimes *sol* and sometimes *do* in the violoncello part, sometimes *la* sometimes *sol* and sometimes *fa*, in the clarinet part, *si* for the 1st trombone, *sol* for the 2nd, and *do* for the 3rd, and under certain circumstances any and every sound whatever for the trumpets and horns.

Nor is this all; the real difficulty of the score reader is to come. He must not only know what sound this or that note represents, but he must—if he is to penetrate the composer's meaning—be able to appreciate, with his mind's ear, that which has no audible existence; he must make one sense do the work of another as well as its own, and, so to speak, hear with his eyes.

The lecturer then spoke of the necessary moral qualities for the orchestral performer, as well as the ordinary musician, —patience, temperance, power of attention, presence of mind, self-denial, obedience, and punctuality. An orchestral performer can neither attain nor maintain even a moderate position in his vocation without continued exercise of those qualities.

The lecturer then proceeded to combat the notion that, as life is not long enough for everything, we should give our time and attention to those studies which are essential, and which bear on the real business of our lives.

As variety of food is indispensable to the highest development of the human body, variety of intellectual food is necessary to the highest development of the human *mind*. Variety of pursuit, if not of itself a recreation, is certainly very near akin to it. *Mere* grammarians or *mere* mathematicians are rarely good for much in school as in life.

He could give more than one instance of this from among his own friends and pupils—more than one instance in which music has taken her place, not to the exclusion of, but in company with, other studies which have brought their reward in honourable mention and pecuniary emolument.

The most careless reader of history or biography will be able to call to mind many names eminent in politics, philosophy, science, military skill, and every subject of human endeavour—of men who have loved or cultivated music; and these, too, persons of the most opposite or various fortune, temper, or manner of life. Martin Luther and King Henry VIII.; Archbishop Cranmer and Sir Thomas More; the poet Spenser and the merchant Gresham; Charles I. and Oliver Cromwell; John Milton and George Herbert, of Salisbury; John Wesley and Jean Jacques Rousseau; and, to take other names at random, King Alfred the Great was the founder of the musical professorship still existing at Oxford; St. Ambrose and Gregory the Great were both not only patrons, but teachers of music. The Emperor Charlemagne was a musician; so was Richard Cœur de Lion. Leonarda da Vinci, at one time of his life, was chiefly renowned for his skill as a lute player. Aldrich, the eminent Dean of Christ Church, was a composer. With the late Duke of Wellington music was an hereditary taste.

Queen Elizabeth appears to have carried mechanical excellence in instrumental music as far as it would go in her day; and Charles V. of Spain, in the course of one of the most arduous lives of which we have record, had found it possible to cultivate music.

The lecturer, though he admitted that some had greater aptitude than others, sweeter and stronger voices, and more susceptible ears, denied that this disparity was commonly so great as to authorise us to despair utterly of the training of any voice, or the improvement of any ear.

He believed that a large majority of the men and women, and all the children in the world, might be taught to sing, so far as to give no offence to their neighbours, and to secure a very great deal of enjoyment to themselves.

The mission of music—its vocation as a humanising agent, will never be fully accomplished till the great mass of mankind can do something towards the creation of it. All musical instruction, whether of children or adults, should *begin* with vocal music. The reasons for this are many. For example, it is an easier first step in musical reading to have to deal with *one* stave, than with two, as we have in piano-forte music. Then a *feeling for time* is more easily created and improved by the mechanical process of making *beats*, than by that of *counting*, which can only supply its place when the hands are on an instrument.

Moreover, large numbers of persons may be taught the rudiments of vocal music together—which is not the case with instrumental music.

Above all, there is much greater necessity for close attention to the *theory* of music in beginning to learn to sing than to play.

The objection that the exertion may be injurious to the health of very young children is answered by saying that everybody who has lived within reach of a nursery knows to his cost, that the lungs of the majority of children are much the strongest of their organs, and it is difficult to understand why there should be more danger in these organs being exercised as instruments of harmony than as instruments of torture. Besides, for a young child one quarter of an hour's practice is all that is required.

The lecturer then concluded by speaking of singing in connection with religious worship, more especially in connection with congregational singing, urging the propriety of making music a part of every child's education —and of every man's who has not learnt it as a child. Let this be done, and in a few years the *Church Music Book* would be as necessary an accompaniment to public worship as the *Book of Common Prayer*, and the power of using the one as much a matter of course as the other.

TUESDAY, JULY 25th, at 5 p.m.

ON ELEMENTARY INSTRUCTION IN MATHEMATICS. BY THE REV. PROFESSOR BADEN POWELL, V.P.R.S.

A few years ago the idea of mathematics being taught in elementary schools was not admitted, and even now there are those who doubt its propriety. If, however, we examine the question, we shall find that mathematics, in some form or other necessarily enters into every course of general instruction. It is true that the higher branches of abstract or pure mathematics may not be common or necessary in elementary schools; arithmetic, at least, which is one portion, has always formed part of the work of every school. Our knowledge of forms, contents, areas, &c., is, as far as it goes, mathematics; land surveying and measuring, again, are mathematics. The curves formed by the intersection of planes and solids one with another are shown practically by means of models, and the

eye learns practically to appreciate them. But to reason on them, and deduce from certain known data the actual properties of such curves, forms another and higher step in the study of mathematics. The object of this lecture was to point out how elementary mathematics may be taught practically with less difficulty than at present is usually thought unavoidable in this country. It has been said there is no royal road to mathematics, but this must be taken with some degree of allowance, and it may be shown that there are means of studying this science with greater facility than by adhering to the old systems at present in use. In this country the custom is to make Euclid the text book for teaching geometry. On the Continent this is not so. No difficulty is arrived at till we come to the theory of parallels, and here the learner is compelled to assume a something which is certainly not self-evident. This is the first difficulty. This may be got rid of entirely by teaching the pupil at once the doctrine of a *limit*. This is not usually done till the more abstruse and higher branches of mathematics are entered upon; but, as it must be learned one time or another, why not teach it at once in the early stages. Give the pupil a distinct idea of a *limit*, and all the difficulties attending the theory of parallels are at once easily resolved. The pupil then passes on till he comes to the fifth book, which, beautiful as it is, is perhaps as difficult a book to be really understood as can anywhere be found; and it may be questioned if one person in a thousand who reads it has any just appreciation of its merits, or can make out why Euclid adopted what seems a long and roundabout way of proving the doctrine and properties of proportionals. The pupil, who by the time that he arrives at this book has usually learnt some algebra, is told by his teacher to cut the fifth book, as too difficult, and that the theory of proportionals may be much more readily proved by algebra. The ancients had a contempt for mere arithmetic, and considered it beneath the dignity of mathematics to be dependent in any way upon the idea of number. Euclid, therefore, rigidly excluded it, and devised what must be deemed a masterpiece of human ingenuity, the discussion of the whole theory of proportionals without introducing the idea of number into it. Algebra, on the contrary, deals with number—once introduce this element and the theory of proportionals becomes as simple as possible. It is true, no doubt, that there are proportionals to which the idea of number is not applicable, such, for instance, as the ratio of the side of a square to the diagonal, &c.; but for all practical purposes, though not with perfect exactness, it is true, numbers may be found which represent their proportions sufficiently near. By dividing each line into a smaller and smaller unit, we shall, by introducing the idea of an infinite number of such units, arrive at a unit in which both lines may be readily expressed in magnitude, numerically. This is the doctrine of infinitesimals, which necessarily enters into the higher branches of mathematics, and therefore why should it not be taught at once, as by this means a very great difficulty is removed out of the way of the learner. We may, therefore, use the algebraical solution of geometrical problems. From the algebraical method of proportions we get this proposition, which is no where proved in the 5th book of Euclid, viz., that the product of the extremes is equal to the product of the means. The idea of multiplication is thus introduced. Now the second book of Euclid may be readily proved algebraically. The product of two numbers or magnitudes expressed numerically is identical with the rectangle. Teach the pupil this, and the second book of Euclid is shortened at once into one simple lesson.

Mathematics, it is said, should be taught as a training for the mind—as, in fact, a practical logic; the benefit in this respect the lecturer considered as greatly overrated, but he held that mathematics should be taught as a key to all physical investigation.

Teach the pupil at an early stage the nature of a limit and the doctrine of infinitesimals, and by these means you remove very considerable difficulties out of his path. It is true that we may sacrifice something of pure geometrical reasoning, but why retain this when the reasons which actuated the ancients no longer compel us to do so. And as to the mass of students, the great object of mathematical studies must be their application to physical science. Surely the easiest and most direct path is the best, and the amount of mathematical study requisite for this purpose will thus be reduced into very narrow compass.

ON ARCHITECTURAL MATERIAL, STRUCTURE, AND ORNAMENTATION, AND THE WORKS OF MR. RUSKIN.

By W. Bridges Adams.

A volume has been put forth by Mr. Ruskin, entitled "Lectures on Architecture and Painting, delivered at Edinburgh," on the architectural portion of which I purpose to make some remarks, as a protest against the sweeping conclusions therein laid down, while thoroughly recognising the great value of the work as a stimulus to vigorous thought and the pursuit of truth in structural and ornamental art.

If I understand Mr. Ruskin rightly, he would prohibit all but Gothic architecture, not merely for temples, but for dwellings and shops; and he would confine the materials for buildings to stone and brick, and possibly timber for high pitched roofs. He is, moreover, very dubious as to the use of iron and glass for structural purposes, on the ground of their not being the materials largely spoken of in Scripture.

I thoroughly agree with Mr. Ruskin's own text, that "the first thing to be required of a building is, that it should answer its purposes completely, permanently, and at the smallest expense;" and by this text I propose to guide my argument.

The first purposes, then, in a building are, space and cover, shelter from rain, from cold or damp atmosphere, from overstrong winds, from heat, from too much light, from the intrusion of vermin or animals. The secondary purposes are as a refuge from the violence of predatory men, requiring strength and incombustibility. The third purpose is as temples of religion, and under this head will come beauty of form and artistic ornamentation, such form and ornamentation being, in truth, only representatives of God's works, throughout the animal, vegetable, and mineral creation.

There are spots of earth so beautiful, so perfectly adapted to man's healthy and enjoying residence, so free from all annoyances, in short, so closely resembling our imaginations of the first Paradise, that man literally requires no shelter whatever, save the shade of the trees, or at most a wattled green bower, such as might be understood by the phrase "under the greenwood tree," without "winter and rough weather." In such countries men live under open colonnades of nature's forest trees.

Agreeing with Mr. Ruskin in the truth that the beauty of Gothic architecture consists in its being a representation of nature's forms, still to a great extent the Greek architecture is the same. The Greek column, and the gothic column find their types in the round boll of the forest tree in a single mass, and the duplicated stems of more slender trees. The simplest known building is the wigwam of the American Red man, from Canada to Cape Horn, consisting of bushes planted in the earth in a circle, and tied together at the top joint, as children in England make rush caps, the boughs so planted being sometimes covered with rushes, or herbage, or plastered with clay, or covered with the skins of beasts. At this day a common method of constructing ovens for baking bread in Chile, is to plant branches in the ground in a circle tied together at top; to plaster it with clay and then burn out the skeleton. A wigwam so built is the type of the high pitched roofs of English, Swiss, Swedish, and other buildings, calculated to throw off snow and rain. Change

the horizontal plan from a circle to a square or oblong and elevate it from the ground on vertical walls or frames, and we have the skeleton of the Gothic building, ready for piercing with doors or windows and doorways. Place two sides of the roof sloping and two sides vertical, and we have the gable.

As we recede from the poles, and travel towards the Equator, and get to drier climates, the buildings are formed of vertical posts, planted in the earth, connected together by beams at top, and the roofs flattened down, and covered with litter or branches. In that form we have the Greek type. In hot climates, with abundance of light, shade is a necessity by day, and elevation above the earth is desirable by night. For these reasons we find that houses in the warm countries of Asia, Eastern Europe, and Southern America, are built on a similar plan: thick walls of unburnt bricks, and flat roofs, also of great thickness, to keep out sun heat. Such flat roofs are desirable for the purpose of cool air in the evening, and to escape surface miasma and surface insects. To construct such roofs in Buenos Ayres hollow palm stems of great strength are laid side by side, spanning the walls across. On these palms are laid flat tiles in several thicknesses, bound together by a cement formed of lime and brickdust. These roofs are thoroughly water-tight in the heaviest rains. Thus a Greek roof is formed by means of an artificial stone, in a solid mass of great size, laid on timber, like a floor.

These flat-roofed buildings do "answer their purpose completely, permanently, and at the smallest expense." The hollow palms are in principle lintels, and they are chemically and mechanically as durable as the cement and tiles and the materials of the walls. Neither a gable nor a high-pitched roof would be desirable, and as they are buildings of only a ground floor there is no need of strong arches over the windows and doors. Plain lintels are sufficient for all the weight that is on them.

Now flat districts, where heat and moisture prevail, are much infested by malaria, and by the results of malaria in the form of mosquitoes and other noxious insects. The malaria and the insects rise to a certain height above the ground, that is to say, to the height of the line of moisture. But if the height of the buildings be such, that the in-dwellers are above the moisture and malaria, they may be as safe in the unhealthy as in healthy countries. There are three conditions essential to the growth of mosquitoes or gnats—heat, moisture, and stillness; and these are the conditions of putrefaction, and the fevers that generate putrid action in living animals. It is therefore desirable that the dwellings in such regions should be lofty, and when dwellings are lofty it is not desirable to add to their height by high pitched roofs, unless it be unavoidable, by reason of snow. Again, lofty buildings presuppose several stories, with floors between each, and it is desirable to keep such floors as these as thin as may be consistent with strength, and the absence of sound from one story to the other, and also to save weight on the walls. In such buildings windows with lofty pointed arches are not desirable, for either the light space must be much diminished at the top of the rooms thereby, or the rooms must be made inconveniently high. If material fitted for square lintels cannot be obtained, then it would certainly be better to resort to the semicircular arch than to run the risk of cracks by insufficient timber or stone.

The tile structure with lime and brickdust (containing oxide of iron) cement, described for flat roofs, or palm trees, is also used for domes and arches. A cathedral roof thus built in Buenos Ayres was found so hard, when it was found needful to set back the front of the building from its encroachment on the great square that it became necessary either to destroy the roof altogether or give up the alteration, when an Italian undertook to perform the operation without a scaffold, which he accomplished by pouring acid into a grove, in the manner of etching, thus separating the required quantity in an even line—a process so simple that the authorities, with Punic faith, deemed themselves justified in mulcting him of four-fifths of his promised reward for overcoming the difficulty

When Mr. Ruskin argues that Gothic structure in a city is more beautiful than Greek, and that regularity of form is not necessarily beauty of form, we may to a certain extent agree with him; but when he assumes that the Gothic form is stronger than the Greek form, the question resolves itself simply into the quality of the material. The load on the material in the Gothic form being chiefly vertical, is a gravitative force requiring cohesion of material against crushing. In the Greek form the lintels are exposed to a horizontal load, which is a strain on the tenacity of the material, a quality requiring fibre, which stone does not possess. For this reason the opening between supports must be kept narrow on the Greek plan of building with stone, unless the depth of lintel be very great, so great that an arch of sufficient strength may be traced upon its surface, in which case all the material below the arch may be considered superfluous, save so far as it may act by tension on its materials to form a tension abutment. If there be no cohesive force to resist tension then the Greek lintel must be considered as a concealed arch just as much as the statue is concealed in the marble block before it is cut. Thus all lintels of brittle material must be considered as equivalent in strength to the arches that may be described in them, supposing always that they be fixed against sufficient horizontal or vertical abutments.

Regarding any kind of stone arch from an engineering or building point of view, in order to determine the relative strength, we find defects in nearly all of them. Beginning with the semicircular form we find it to consist of a number of wedges radiating from a common centre. This arch is wholly supported on piers, or horizontal foundations. It is supposed to sustain an equal pressure on every side. But if the crown only be loaded there will be a tendency to force the wedges together at top and to separate them below, the converse action taking place at the haunches or sides. If the haunches be loaded, there will be a tendency to compress the lower parts of the key-stone, and to open the joints above. The strength of this arch, therefore, depends on equal compression on all sides. To assist unequal compression it would be requisite that each wedge stone should be connected to its fellow by a fibrous tie calculated to resist tension, as, for example, an iron bar.

The elliptic arch is formed from the semicircular by lowering the upper portion to a flatter curve. This throws greater stress on the upper parts of the bridges at the centre, and on the lower part of the bridges at the sides, and lateral abutments are also needed to resist the tendency to spread. As the elliptic arch becomes flatter, it becomes still more weak; brick and stone crushes, and cast iron is resorted to.

The continuous flattening of the elliptic form at last brings it to a beam or lintel, and cast iron in that condition is subject to the same disadvantages as stone by imperfect tensile cohesion, though in a less degree. To make the entire beam perfect the lower parts should be strengthened with fibrous wrought iron; and thus, if properly executed, a perfect beam is produced.

Mr. Ruskin says (p. 158), "It is a nobler and more ingenious thing to build an arched bridge over a stream than to lay two pine trunks across from bank to bank; and, in like manner, it is a nobler and more ingenious thing to build an arch over a window, door, and room, than to lay a single flat stone on the same space."

Now, inasmuch as Mr. Ruskin's own text, "the first thing in a building is to answer its purpose completely, permanently, and at the smallest expense," a bridge of wrought and cast iron, made chemically durable, is a "nobler and more ingenious thing" than any stone bridges, for it will admit of the most level roadway, with the least possible encroachment on the headway of the stream, at a considerable less expense than the stone

bridge; and the amount of intellect that enters into its structure from first digging the iron ore and the coal, the tools used in mining, the machine for lifting, the safety-lamp, the furnace, the chemical knowledge, the rolling-mill and machinery, the drawing, the pattern-making, the moulding and founding, and the erecting—all these immeasurably outweigh the stone blasting and hewing. And the scope for ornamentation in the cast-iron reproduced from the handwrought carvings in wood is far greater than that of the stone bridge. And for the lintel, even for the door or window, the same argument will hold good.

If Mr. Ruskin means that "Gothic and Romanesque structure is nobler than Greek construction" *in stone*, it will hardly be disputed, unless the stones were of some such enormous size as to need great engineering skill in lifting them. There is less skill required to set out a Gothic arch than a complicated system of lifting machinery. If Greek form be desirable for useful purposes, then great skill may be required for the preparation of large lintels and flat floors—not such structures as Mr. Ruskin justly scoffs at, for "scientifically tumbling down"—but efficient artificial structures, and it will soon appear that greater skill is needed for large horizontal structures than for vertical ones. It is an easier thing to build a vertical tower, as of Babel, or an inclined one as of Pisa, than to span the flood of the Menai. It is an easier thing to raise a York or a Nelson column, than to chain together the twin banks of the Thames with a swinging roadway. And if it were desired to make a suspension bridge graceful as the wild tendrils of India or America, that first threw themselves across the mountain torrents, many are the climbing plants that could be imitated in metal.

Gothic arches are of several kinds, varying from low to high pitches, some merely resembling the elliptic arch, save that the upper part finishes in a point or angle. This low, flat Gothic, or Tudor Gothic, has little claim to strength, whatever it may have to grace of form, inasmuch as the strength depends upon endthrust and abutment in a horizontal direction. In very flat forms it approaches to the lintel, and has a similar tendency to crush downwards. In the vertical lanceolated form, the thrust is downwards, and when the lateral curve is very flat, undue pressure of the wall on the haunches would tend to thrust it inwards, or insufficient pressure might cripple it outwardly. The lanceolated projections, called the cusp or spear point, would in such case serve to stiffen the sides of the arch, upon the same principle as the thickening of the Greek column at the centre of its length. This has been pointed out by Mr. Ruskin. And the central mullion dividing into two branches produces a similar effect.

The horseshoe arch of the Arabs is a Gothic arch, formed of two illipses joining in a point abone; in fact, each half is the same form as that of the flat or Tudor Gothic; in the Arab form placed more vertically; in the Tudor form placed more horizontally. The inside of this arch is sometimes furnished with several cusps, but this form does not give any indication of an intentional addition to strength.

In tracing the growth of the Gothic arch, its earlier type would seem to be found in the inclined door-jambs of the Egyptians, wide at bottom and approaching closer at top to permit the use of a shorter lintel. Next follows what may be called the gable arch, used by the Saxons, formed by two straight lines converging together to form a headway springing from the door-jambs, in fact the principle of the spire or steeple. This would be a weak form to resist vertical weight, and outward curvature form would supply additional strength. The cusp added to the inside of the arch would give still more strength on the principle which forms a scale beam on the lever beam or connecting rod of a steam-engine, the ends tapering thinner from the centre.

It will be seen that the Gothic arches are all variations of the pitched roof commencing with the Indian wigwam, and from which Mr. Ruskin has traced the origin of the steeples, the etymology of which word indicates it quality of steepness. The sides of the arch are the rafters, the central mullion spreading above into wings, forms two diagonal thrusting-bars as queen posts, and the sill is the tie-beam. The cusps may be regarded as rudimentary queen posts, not ending in abutments.

Mr. Ruskin lays some stress on the difference of the ornamentation of the modern Greek and Antique Gothic, the former being unnatural and the latter natural. But there does not appear to be any reason why the Greek ornament should not be natural as well as the Gothic. In both cases the structure is geometrical; and though the Gothic form unquestionably gives more beautiful outlines than the Greek, the surfaces are equally susceptible of beautiful details. In asserting that the Gothic is the cheapest structure there is very much room for doubt, especially as Mr. Ruskin affirms that all must be the work of masters, of individual hands and brains, and would appear to forbid all cheap processes of multiplying forms.

Supposing the uses of artificial material, all question of inferior strength, either in Greek or Gothic, ceases. Any form, any amount of space can be attained equally well on either system, and, it may be added, with far better results.

That Greek columns may even in stone be made to produce a beautiful effect, apart from outline, is proved by examining the Madeleine at Paris. The columns are fluted, and are built up of stones whose thickness corresponds to that of the flutes. The result is a trellis work, —whether intended or not by the architect I do not know —but of very beautiful effect. The hard outline of the stone has disappeared, and we might suppose the columns to be ornamented with living climbing plants.

Mr. Ruskin dwells with pleasing fervour on scriptural and poetic words and phrases relating to architecture. He eschews Greek terms, and dwells on the poetic sounds of Gothic imagery. But it must not be forgotten, that the "lintel and door-posts and thresholds" are the chief architectural features referred to in Scripture. And when we find that the Shunamite widow "made a bed upon the wall" for the benefactor prophet, we must necessarily believe that the wall was not of Gothic, but of Eastern structure, probably in connection with an eastern flat roof.

Mr. Ruskin's arguments are based on the "assumption that all architecture is to be of brick or stone;" and he treats iron and glass as very questionable materials. But the words *brick* or *stone* admits of the two great divisions of natural and artificial materials. In this attempt to bind us down to the literal words of Scripture, the door is opened to the stoppage of progress, and it is essential that this matter should be rightly understood. God has given us the natural materials of the world to use as we will, according to the growth of our faculties. The ancient nations used mud and unburned bricks, and so do some modern ones, as a facile material; advancing skill used rubble stone or flints, and lime mortar; farther skill, prompted to use, easily wrought quarry stone for the irregular rubble work; then followed hewn stone, squared by line and rule, and so on through all the processes of structure and ornament. And we may be sure that the softer stones were first used, as witness the alabaster of Assyria and Egypt, till gradually skill mastered the granite and harder stones. Now, if it be lawful according to Scripture to burn shells, either in their natural form, or in the sedimentary form of limestone and marble, to form cement for stones, or to use natural asphaltum or other substances for cement, there is no reason why, if practicable, the whole building should not be so constructed. And if one kind of artificial material may be used, why not any and every kind. Lime is a metal in the form of an oxide. Other cements contain iron in the form of an oxide; and if iron may be used as an oxide, why not freed from the oxygen provided it could be made durable. To go upon the assumption that we are only to use

materials as God has given them to us, would be to go back to caves and hollow trees. It would be a mere quibble to say that it is lawful only to use mechanical alterations of material by axe and adze, and chisel, and mallet, and that chemical alterations are prohibited. If such a dogma is to be laid down, under the alleged sanction of Scripture, for the arts of building and archicecture, why should not Scripture also be the law for other arts. Thus, ships should be built in the form and proportions of the ark, and the mariners' compass should be set aside, and mariners resort to the guidance of the greater and lesser lights of heaven, as of old.

This cannot be; God gave materials, but he also gave invention to man, the instinctive perceptions implanted in man's mind; and works of art and artificial materials are therefore as much God's work as the heavens and the earth, and all the materials that therein are. We must conclude that in this particular Mr. Ruskin has been carried away by his imagination, and the feelings of the orator appealing not unnaturally to the habits of thought peculiar to his auditory. This part of his case may, therefore, be dismissed as "not proven," and we may proceed to consider the question of material on its own merits, "answering the purpose completely permanently, and at the smallest expense."

In our northern climates we need shelter for the most part of the year from rain, wind, and cold—for a very small part of the year from sun and heat. The object therefore to be aimed at is to obtain under cover just such a temperature as is most agreeable while reposing in the open air. The most perfect arrangement we could imagine for this purpose would be a huge glass dome or arch of the transparent hue best fitted for vegetation, of the height and size calculated for the loftiest trees, with provision for heating and ventilating at pleasure—a dome or arch entirely of glass in massive blocks—pure as transparent air, and interlocked by being cast in forms to dovetail together without cement or framework. If we could imagine a vault of pure transparent glass in one piece that would be the perfection of the object. This would answer our purpose, with the right chemical preparation, "completely and permanently." Whether at the smallest expense—supposing blocks of glass—is yet a question for experiment, but not an improbable one. Under such a dome or arch numerous families might dwell, not requiring any building whatever, but merely screens or partitions. And such a structure—supposing the glass to be chemically perfect, would require no repairs whatever, for the thickness would preclude fracture, and the material would preclude decomposition. There would be neither gutters to clear out, nor putty, nor paint, nor whitewash to make good and the expansion and contraction of the material by change of temperature would be homogeneous.

For the purposes of a temple such a structure would be perfectly suited. If ornamentation in imitation of God's works be a fitting thing for a temple, the works themselves would be still better fitted. If it be a holy thing to visit the Holy Land to gaze on the scenes of the Saviour's life it would be just as holy to gather beneath a transparent temple the trees and shrubs of the Wilderness and of the Mounts whereon he was accustomed to walk and teach. It is just as worthy a thing to reproduce these scenes in their natural condition as to produce paintings of them. If the tracing of vegetation carved in stone be beautiful, the vegetation itself—God's own work—must be more beautiful. Even the ribald jester Scarron, in the time of the debauched Louis, he whose youthful beauty was withered up in the pursuit of an obscene wager, which left him an object for scorn and mockery, even he understood well the distinction between God's work and man's, when he claimed, by a process of mock logic, to be the most beautiful thing in the world. Many are the good and the wise who recognise open air preaching as a holy work. An invisible roof of glass, translucent, would be equivalent to open air preaching the year round. There is nothing costly in the material of glass, nor would there be in its production were only the demand for it sufficiently great. If the only consideration in temples and public buildings were for a time to be limited to mere comfort and light, the same result would take place as obtained in the manufacture of iron, in which railways have commanded a production equal to the demand.

(*To be continued.*)

Proceedings of Institutions.

Woburn.—The Committee of the Literary and Scientific Institution has issued a circular, calling the attention of the members to the resolutions of the Council of the Society of Arts, relative to the arrangements for enabling artizans and others to visit the Paris Universal Exhibition of 1855. A committee, consisting of Messrs. R. C. Stratfold, E. Ward, and W. Farrow, has been appointed to aid in carrying out this object.

MEETINGS FOR THE ENSUING WEEK.

Mon. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Rev. C. Marriot, "On the Digestion of Knowledge."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Dr. G. Latham, "On the Phonic and Phonetic Systems of Teaching to Read in the Ordinary Print."
Entomological, 8.

Tues. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Rev. C. H. Bromby, "On the Aims and Instruments of Real Education."

Thurs. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Dr. Scott, "On Teaching the Deaf and Dumb."
Zoological, 3.

Fri. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Rev. E. Sidney, "On Teaching the Idiot."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Professor Tennant, "On Mineralogy and its Application to Geology and the Arts."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 20th July, 1854.

Par. Numb.
366. Ordnance—Supplementary Estimate (a corrected Copy).
364. Courts of Law—Return.
383. Army—Supplemental Estimate.
309. Public Income and Expenditure (Balance Sheet)—Account.
222. Bills—Inclosure, &c., of Land.
227. Bills—Duchy of Cornwall Office.
229. Bills—Admiralty Court.
230. Bills—Friendly Societies Acts Continuance.
Census of Great Britain, 1851—Population Tables, Vol. 1, (Part 2.)
Marriages in Ireland—Fourth Report of the Registrar General.

Delivered on 21st July, 1854.

223. Bills—Militia (Ireland).
228. Bills—Marriage Acts.
Census of Great Britain, 1851—Population Tables, Vol. 2, (Part 2).

Delivered on 22nd July, 1854.

162 (1). Dungarvan Election—Return.
370. Metropolitan Bridges—Report from the Select Committee.
374. Poor Removals—Return.
377. Crown Forests—Report from the Select Committee.
379. Metropolitan Commission of Sewers—Returns.
233. Bills—Bribery, &c. (as amended by the Select Committee, and in Committee).
235. Bills—Land Revenues of the Crown (Ireland).
236. Bills—Land, Assessed, and Income Taxes.
237. Bills—Reformatory Schools (Scotland) (as amended in Committee, on 1 and 2 Re-commitment, and on Consideration of Bill, as amended).
232. Bills—Bankruptcy.
234. Bills—Burials beyond the Metropolis (amended).
Birmingham Borough Prison—Report of the Commissioners.
Leicester County Gaol and House of Correction—Report of the Commissioners.
Queen's College, Galway—Report of the President.

Delivered on 24th July, 1854.

368. Bankruptcy—Return.
387. Military Savings Banks—Account.
392. Russian Dutch Loan—Account.
398. Civil Services—Estimates, Class 8.
384. Ventilation and Lighting of the House of Lords—Report from the Lords Committee.
238. Bills—Metropolitan Sewers (amended).

239. Bills—Bribery, &c. (as amended by the Select Committee, and in Committee, and on Re-commitment).
Criminal Offenders (Ireland)—Tables.

Delivered on 25th July, 1854.

286. Bristol Channel—Return
394. Metropolitan Sewers—Copy of a Letter.

Delivered on 26th July, 1854.

363. Cholera (Ireland)—Correspondence.
386. York, Newcastle, and Berwick Railway (Construction of Docks, &c.) Bill—Minutes of Evidence.
389. Spirits (Navy)—Correspondence.
393. Education (India)—Copy of a Despatch.
397. Monies in the Exchequer—Account.
205. Bills—Judgment Execution, &c. (as amended by the Select Committee, in Committee, and on 2d Re-commitment).
240. Court of Chancery.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, July 21st*, 1854.]

Dated 2nd June, 1854.

1368. General H. Dembinski, Paris—Heating apparatus.

Dated 3rd July, 1854.

1448. J. K. Milne, Edinburgh—Means of holding letters.
1449. B. Walters, Wolverhampton—Spindles for locks and latches.
1450. P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury
1451. W. Greenshields, Edinburgh—Chenille fabrics.
1452. W. Balk, Ipswich—Friction dynamometer.
1453. A. V. Newton, 66, Chancery lane—Marine engines. (A communication.)
1454. J. Hopkinson, jun., Huddersfield—Steam boilers and furnaces.
1455. E. A. D. Guichard, Paris—Ornamenting fabrics.
1456. U. Chauveau and C. d'Epinois, Paris—Preventing collisions on railways.

Dated 4th July, 1854.

1457. J. Sunter, Derby—Drilling machinery.
1459. C. T. Tiffany, Leeds—Brushes used in gig mills.
1460. T. Haines, Melbourne, near Derby—Gloves and mits.
1461. J. Mc Gaffin, Liverpool—Corrugated cast iron.
1462. J. A. C. N. Delpech, Castres—Pump.
1463. J. Newman, Birmingham—Rods, rails, and bars.
1464. J. M. Bardet, and F. Collette, Paris—Matches.
1465. R. and R. Garrett, jun., Saxmundham—Machinery for drilling seed and manure.
1466. G. D. Bishopp, Inverness terrace—Engines for steam, air, gases, or water.
1467. T. Elliott, Manchester—Safety valves.
1468. H. Heycock, Manchester—Hydraulic presses.
1469. D. Bowlas, Reddish—Healds or harness for looms.
1470. J. H. Johnson, 47, Lincoln's inn fields—Motive power. (A communication.)
1471. J. H. Johnson, 47, Lincoln's inn fields—Coating iron with copper. (A communication.)

Dated 5th July, 1854.

1472. L. J. Cheval, Raismes—Beer engines.
1473. J. Burch, Crag hall, near Macclesfield—Marine and other steam engines.
1475. T. Restell, Strand—Parcel holder.
1476. W. Symes, Pimlico—Tills.

Dated 6th July, 1854.

1480. J. Glasgow, Manchester—Cutting, shaping, &c., metals.
1482. O. Avery, 16, Castle street, Holborn—Sewing and stitching machines.
1484. J. Lamb, Newcastle under Lyne—Machines for cutting paper.
1486. J. Radcliffe, Stockport—Power looms.
1488. J. H. Johnson, 47, Lincoln's inn fields—Electro-magnetic engines. (A communication.)
1492. J. Petre, jun., Rochdale—Scouring wool.

INVENTION WITH COMPLETE SPECIFICATION FILED.

1520. W. Eassie, Gloucester—Trucks used on railways.—12th July, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed July 21st, 1854.

171. Richard Archibald Brooman, 166, Fleet street—Improvements in machinery for sawing stone and marble.
199. George Firmin, Bath—Improvements in anchors.
223. William Hodgson, Wakefield—Improvements in machinery for the manufacture of looped fabrics.
241. Pierre Joseph Meeus, Paris—Improvements in producing metallic surfaces.
255. John Jobson, Litchurch works, near Derby, and Robert Jobson, Holly Hall works, near Dudley—Improvements in the manufacture of moulds for casting metals.
273. William Longmaid and John Longmaid, both of Beaumont square—Improvements in the manufacture of vegetable charcoal.
309. John Ramsbottom, Longsight, near Manchester—Improved hoist for raising and lowering railway rolling stock and other articles.
513. Thomas Dawson, King's Arms yard—Improvements in umbrellas and parasols.
591. James Wright, Manchester—Improvements in machinery or apparatus for "curing" and "liquoring" sugar by centrifugal force. (A communication.)
819. William Rigby, Manchester—Improvements in machinery or apparatus for engraving metallic cylinders or rollers employed for printing calico and other surfaces.
845. Edward Lavender, 87, Princes road, Bermondsey—Improvements in apparatus for stirring and acting on matters subjected to heat in retorts.
1001. James Nasmyth, Patricroft, near Manchester—Improvements in the process of puddling iron.
1051. Warren de la Rue, Bunhill row—Improvements in distillation.
1065. Moses Poole, Avenue road, Regent's park—Improvements in fire-arms.
1087. Thomas William Miller, 6, Queen's place, Southsea—Improvements in railway sleepers.
1109. James Colley March, Barnstaple—Improvements in vices.
1117. Edouard Auguste Désiré Guichard, Paris—Improvements in the manufacture of ornamental fabrics for decorating walls or other surfaces.
1171. Allan Livingston, junior, Portobello—Improvements in earthenware pipes for drains and sewers.
1173. Gardner Chilson, of Boston, U.S.—Improved furnace or heat generator and radiator, to be used for warming buildings or apartments, or for various other useful purposes.
1175. Mahlon Loomis, Massachusetts, U.S.—Improvement in the manufacture of artificial teeth.

Sealed July 25th, 1854.

204. Henry Tendall, Hoxton, and William St. Clair Trotter—Improvements in machinery and apparatus for crushing, washing, and amalgamating auriferous quartz and other ores.
207. William Partington, Bolton le Moors—Improved construction of safety valve for steam engines.
242. William Malam, Blackfriars road—Improvements in apparatus for the manufacture and holding of gas.
246. Claude Bernard Adrien Chenot, Paris—Improvements in accumulating, conducting, and treating gases of combustion, and also in generating and applying the same to metallurgic and other purposes.
280. William Little, Strand—Improvements in distilling or obtaining products from coals and bituminous substances.
286. Robert James Maryon, 37, York road, Lambeth—Improvements in the machinery for the improved construction of windlasses and other machines for which the same invention is applicable.
337. John Jennings, jun., Lorton, Cumberland—Improvements in brakes for railway and other carriages.
447. Charles Cowper, 20, Southampton buildings—Improvements in the manufacture of potash and soda. (A communication.)
454. Thomas Forsyth, Wolverton—Improvements in furnaces.
498. Thomas Henry Ewbank, South square, Gray's inn—Improvements in the manufacture of terry or looped fabrics, and in machinery for producing the same.
710. George Collier, Halifax—Improvements in looms for weaving terry and cut pile fabrics.
912. George Jones, Spring Vale Iron works, Sedgley—Improvements in landing apparatus to be used in working mines.
1062. Moses Poole, Avenue road, Regent's park—Improvements in machinery for splitting leather.
1064. Moses Poole, Avenue road, Regent's park—Improvements in engraving and printing on glass, and of figuring and ornamenting the same.
1090. Thomas William Miller, 6, Queen's place, Southsea—Improvements in railway sleepers.
1138. Andre Prosper Rochette, Brighouse—Improvement in the manufacture of soap.
1174. Samuel Sweetser, Massachusetts, U.S.—Improvements in preparing skins or hides for the application of tanning thereto, or for being tanned. (A communication.)
1197. Michael Scott, Great George street, Westminster—Improvements in joining or connecting pipes.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
July 20.	3619	A Washing, Wringing, and Mangling Machine	George Graham	New Meadow lane, Leeds.
„ 21.	3620	Locomotive and Self-adjusting Centring for Sewers, Culverts, &c., of any size or shape	Joseph Jeffrey Bennett	11, Saxon street, Dover.
„ 22.	3621	Sea Chest	Joseph J. Galt	Portsmouth.
„ 25.	3622	Sinclair's Railway Information	John Sinclair	South road, Waterloo, near Liverpool.

Journal of the Society of Arts.

FRIDAY, AUGUST 4, 1854.

MEETING OF COUNCIL.

August 2, 1854.

The following Institution has been taken into Union since the last announcement:—

366. Newcastle-on-Tyne, Church of England Institute.

Educational Exhibition.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £1,024 14s. 6d., including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

TWELFTH LIST.

	£	s.	d.
The Bishop of Bath and Wells .	2	2	0
Joshua W. Butterworth . . .	1	1	0

ABSTRACTS OF LECTURES, PAPERS, AND DISCUSSIONS.

Tuesday, July 25, at 8 p.m.

On Models and Diagrams. By Thos. Sopwith, F.R.S.

The lecturer commenced by stating that his present object was to speak of models and diagrams as applicable to ordinary use in schools. Of these, models were, he considered, the more valuable, inasmuch as they are a representation of the solid form of an object, and can be viewed in any direction, whereas a diagram, even in its most pictorial form, only presents one aspect of the object, and if different portions of the same object are required to be shown they are necessarily separated. The portability and cheapness of diagrams as compared with models, renders them better adapted for extensive use in schools, and the disadvantage of presenting only one face of an object becomes a means of instruction, inasmuch as all the practical applications of drawing depend on a right appreciation of the laws under which solid forms can be represented on a plane surface.

The real use of the model is to carry the mind from the actual observation of a small object presented to the eye to the comprehension of a large object, not presented to view; and in doing this, the mind is necessarily employed in a study of relative dimensions, and of corresponding forms. Excellent models of geometrical forms, as the cube, &c., are to be had at a small cost; but in the smallest village school, unprovided with funds for the purchase of expensive models, much may be done at a very small cost; as for example, the construction of a cube may be explained by a piece of pasteboard, and so of the other simple geometrial figures; and the mode of construction is indirectly an explanation of geometrial conditions, as for example, that the tetrahedron is bounded by 4 surfaces—the cube by 6. The gonigraph may be easily made by a country carpenter, or even by a skilful lad, and is well represented by the ordinary scales or rules used in France. It affords a ready model of various geometrical figures.

In astronomy it is desirable that all scholars should learn something of the motions, and magnitudes, and distances of the heavenly bodies. The most rapid motion which can be readily comprehended by boys is about 20 miles an hour, or one mile in three minutes. It is about double the quickest speed they see in road vehicles, and is a usual rate on railways; but it will be brought still nearer to their comprehension within the walls of the school-room, by a white ball fastened to a string of about 3 feet in length, and whirled round at the rate of two revolutions, nearly 40 feet in each second, and by graduating the length of the string, and timing the revolutions to 120 in each minute; the length of a mile may be described by the ball in 3 minutes, and if this were continued an hour we should have 20 miles of space passed over by the ball. When once the minds of children are directed to a palpable illustration of this kind, they have obtained as it were the seeds of knowledge—they have a foundation on which to rest all future researches of a like kind, and without some such solid, distinct, clear, and palpable exhibition of the rate of motion, no definite ideas will be afforded by the most skilful and elaborate study of mere figures unapplied to some such datum. Very few persons have clear conceptions about space and motion. If we ask a child the meaning of a sentence which it has read, we probably find that no solid or distinct ideas of the meaning of the sentence have been formed, and so it is with children of a larger growth. With men, and even with able and accomplished men, propositions involving large conditions of space and motion are read by them, and stated by them as truths, without even attempting to resolve them into tangible considerations. What, for example, is so common as to hear it said of Archimedes, that if he had a fulcrum on which to rest, the power of a lever would enable him to move the world; and so it is taken for granted that by an enormous lever the weight of Archimedes, exerted at the extremity of its enormous arm, would suffice to move the world. In theory this is true, but how few have an idea how far it is from all practical value. If Archimedes had machinery free from friction, and in perfect equilibrium, so that his whole power could be made available, it would require him, at 16 hours a day, and using his whole power, more than *seven millions of years* to move the earth through the *one-hundred millionth part of an inch.*

Mr. Sopwith then proceeded to explain various other kinds of models, which were capable of being simply constructed in paper and cardboard as geological models—models of local districts—models of school-rooms, &c.

He referred to the lectures of Richard Dalton, as an example of the great utility of models, illustrating mechanics, hydraulics, hydrostatics, optics, astronomy; and spoke of several other mechanical models. He considered that collections of models should be made in every large town, and that Government should offer premiums for their production.

Under the head of diagrams, the lecturer spoke as to—1, the principles of construction; 2, the objects capable of illustration; 3, the materials to be employed; and 4, the special advantages they afford in promoting education. A diagram being the representation of one or more objects on a plane surface, due regard must be paid to the exhibition of it in such a form as to convey a clear idea to the mind. An uninstructed person, who, for the first time, attempts to make a diagram of a cylinder, is disposed to make a circle for the top, and then continue lines to represent the length of the cylinder. Again, an inexperienced draughtsman, wishing to represent the shaft of a mine,

with two roads at the top, one running direct north and the other east, and with two drifts, or galleries at the bottom, one going south and the other west, would in the first instance, represent the roads the same as on an ordinary ground plan, with the top of the pit (or hollow cylinder) at the point of intersection. He would proceed to lay down the shaft in a perpendicular line, and the south and west drifts in their relative position to the north and east roads. The fallacy of this figure must be apparent to every person. We perceive, then, that every diagram must be designed in a certain relation to the truth, in order to convey correct ideas to others. The methods of effecting this are,—first, by a ground plan; secondly, by a sectional plan; thirdly, by an isometric projection; and, fourthly, by a parallel projection. If the object to be designed or explained only has relation to one uniform plain surface, then the first of these modes is all that is required; but in every solid object the representation must depend on one or other of these methods of projection, unless perspective delineation is necessary. Diagrams require a close adherence to geometrical accuracy, and, for the most part, are capable of being delineated by projection by parallel rays. The first and second of these modes are especially meant to represent one surface only. When solid forms are to be delineated, we may have recourse to the third method, which is best explained by reference to a cube, with a house and tower upon it. The fourth plan is based on the theory of shadows, by which a principle is afforded for a mode of delineation of great practical value.

Of the objects capable of illustration, Mr. Sopwith first adverted to Number, which might be represented by a space of length, and its relation to other numbers by lines of comparative length: thus we had a method of teaching addition, subtraction, multiplication, and division, which ought to be in use in *every* school. The next general application of diagrams is to represent space, in relation to area, for as to mere extension, that is only the repetition of number. In areas we have to deal with a different mode of progression, and the *line* 3 times the length of another, is the index to an *area*, if square, of 9 times. And we may proceed, from the relative size of the school-room, one square mile, one hundred square miles, England, Scotland. and Ireland, Europe, and finally the globe; and so by a series of well-studied diagrams, the mind may be carried from magnitudes easily understood, to those vast distances which can only be comprehended by patient study; but which process is equally required in every department of art and science.

This subject is one which is scarcely at all known in hundreds—nay, in fact, in the great majority of the humbler class of schools. The few examples adduced would serve to show the useful aid which they afford to the teacher, the animation they impart to otherwise dry and uninteresting lessons, the awakening of *new* ideas in the mind, and the formation of correct habits of thought. All these show forth the value of such means of illustration in the school, but *here* their value only begins, for they establish in the eye of the youthful student an exact habit of observation, which will be of the greatest use in every stage of life; whether it be in the recreations of travel, in the pursuit of science, in the following industrial occupation of any kind, however humble, scarcely a day can pass without affording some opportunity of applying the kind of knowledge which has been imparted; in every department, from the complicated details of finance, or other difficult statistical conditions, which claim the mind of the statesman, down to the humblest artizan, well-constructed diagrams may be made the means of presenting, as it were in one field of view, combinations and relations of numbers, value, or space, in relation to time, or other conditions, in a way which cannot be done by means of figures or descriptions.

WEDNESDAY, JULY 26th, at 3 p.m.

ON SCHOOL DISCIPLINE, AND ITS EFFECTS ON THE BEHAVIOUR OF CHILDREN. BY THE REV. J. P. NORRIS, H.M. INSPECTOR OF SCHOOLS, AND FELLOW OF TRINITY COLLEGE, CAMBRIDGE.

The lecturer explained the purpose of his address, by stating that he had been invited to give it in consequence of a letter which he had addressed to the Council of the Society of Arts, expressing his apprehension of one possible danger attending this exhibition—the danger of an undue prominence being here given to the *material* as compared with the *moral* elements of a school's efficiency—the danger of people going away with the notion that a school's excellence depended more upon what was here so largely represented—the form of the building, the shape of the desks, the apparatus—than what alone gave value to all these appliances—the discipline, the temper of the government; the *moral* influences, in short, that were brought to bear upon the children. He was desirous that in this lecture-room an emphatic protest should be entered against any such mistaken inference from the Exhibition upstairs.

Nor was the protest needed here only. In the country at large there was a continual need of asserting and vindicating the paramount importance of this moral side of education.

Among those who addressed the public, whether in pamphlets, or in speeches, or in sermons, there was a constant tendency to take that view of education which the public could easily recognise. The only *means* of education of which the public were cognisant were such as could be purchased by money; the only *results* that the public could readily appreciate were such as could be expressed in statistics.

The lecturer's earnest wish was that his audience should go away convinced that when they had built the most perfect school, furnished it with all that was most approved shown the most flattering results in the statistics of instruction, they might, after all, have done next to nothing towards really educating the children.

In order to prove this thesis, he drew a detailed picture of two schools, supposed to be equally complete in *all* their material appliances, and equally successful in their statistical results, with an equal amount of approved religious instruction in each, but differing in this—that the moral influences in the one school were throughout the day healthy and good, and in the other were unsound and little attended to. In this parallel (which formed the principal part of the lecture) he endeavoured to point out the effects as severally exhibited in the behaviour of the children; in those many traits of discipline which might escape any but the sensitive eye of an inspector or school-teacher. And having done this, he appealed to his audience to say whether they could have any sort of doubt about the comparative value of the two schools.

The public might be quite at a loss to understand why the report on one was so favourable, and that on the other so unfavourable; why the one school was turning out such well-behaved young people, good sons, good daughters, good servants, good apprentices, while the other was comparatively failing in these all-important results. Perhaps the managers of the latter school might feel aggrieved that the discipline should be characterised as bad, when the drill was so exact and soldierlike. But what Selden, in his "Table Talk": said of a higher subject was true of *drill* without true *discipline*, "He that has not religion to govern his morality is not a drachm better than my mastiff-dog. So long as you stroke him, and please him, and do not pinch him, he will play with you as finely as may be; he is a very moral mastiff; but if you hurt him, he will fly in your face and tear out your throat." Your smart school, dragooned into almost military order, was admirable so long as the master's eye was upon it, and you merely glanced along the files; but if you took the children one by one, and looked into their countenances,

or overheard them at play, or followed them to their homes, you would become painfully aware how artificial had been that drill, how far from habitual that good behaviour, nor would the intellectual results of such a school be found to be really good. It would be found that what had been attained was rather a well-stored memory, and expertness in making use of it, than any power of reflection or of forming a right judgment, or good taste, or, in one word, thoughtfulness.

And it might be doubted whether these results, this kind of knowledge, might not, after all prove useless. It might be doubted whether memory without judgment, skill without taste, cleverness without thoughtfulness, were a sort of intellectual training that would do much to raise our youth.

Much more might it be doubted whether sharpness of intellect without discipline of character; aptness in choosing means, without wisdom in choosing ends; knowledge of good and evil, without the love of the one and hatred of the other—would prove a blessing to our children or to the nation.

We might do well to remember that he who of all others was least open to the charge of want of faith in education, who might rather be called its best vindicator and assertor, the great advancer of learning—Lord Bacon, had expressed the same doubt. Speaking of mere knowledge, he said that, "Without the corrective thereof, it had in it some nature of venom or malignity, and some of that venom, which is ventosity or swelling"; and he added, "This corrective spice, the mixture whereof maketh knowledge so sovereign, is *charity*."

"This it is," the lecturer concluded, "this charity, as Bacon calls it,—using the term in its largest, most apostolic sense—this charity it is which should be to our schools what the spirit is to the body animating, informing it, persuading the heart while the lesson-book instructs the head. I have called it the moral element of a school's efficiency. The terms are wholly inadequate to convey my meaning. It is something which escapes definition, as its results elude statistical expression. It constitutes the spiritual life of a school, the gracefulness of its daily action. It is more than certificates, more than training, more than money can secure in a teacher; it is the unbought service of a good man's heart, which is indeed beyond all praise, beyond all price. It must therefore be felt, it cannot be expressed. The purpose of this lecture has been to make you feel it as I feel it. Once felt—I am very sure you will go away convinced of its paramount importance, if education is indeed to be, what I trust in England it ever may be, the training of all that goes to make up a man—hand, head, and heart—body, mind, and spirit—for the service of man's Maker."

THURSDAY, JULY 27, AT 3 P.M.

ON ELEMENTARY INSTRUCTION IN ASTRONOMY BY MEANS OF MODELS. BY THE REV. PROFESSOR BADEN POWELL, V.P.R.S.

The object of this lecture was to exemplify the illustration of several points in astronomy by means of models, chiefly invented by the lecturer.

1. The first model exhibited was an ordinary terrestrial globe, mounted in the usual way, with its axis properly inclined, to which is added a vertical frame, or flat circle, marking the boundary of day and night, while the foot of the globe has a rim marked with the days of the year and signs of the Zodiac; and by setting this for any day, with the day opposite the meridian, the position of the globe with respect to the sun is at once exhibited.

2. A model of the moon's orbit, with the position of its nodes changeable, thus showing the occurrence or non-occurrence of eclipses at conjunction and opposition.

3. A set of radiating lines, bounded by squares at equal distances from their origin, showing the decrease of an intensity of any kind of emanation diverging equally on all sides from a point in proportion to the *square of the* distance.

4. A sliding model, by which is shown the phenomenon and explanation of the *aberration of light*. A telescope at first pointed to a star moves parallel to itself along with the earth; at the same time light is seen descending from a star, which comes down the tube of the telescope, but does not reach the observer's eye at the bottom of it till he has advanced such a distance that the telescope is actually directed to a fictitious star at an interval of a considerable angle from the real star.

5. A model exhibiting the orbital motion of a planet or comet in an ellipse about the sun in the focus, describing the part of the orbit nearest the sun with great rapidity, and the distant part very slowly, in obedience to the law of describing *equal areas* (not equal arcs) *in equal times;* this is effected by a peculiarly simple contrivance, without cogged wheels, or elliptic curves, &c., as in the complicated instruments sometimes made.

6. An illustration of the *precession of equinoxes*, by means of a globe mounted with the ends of its axis resting in a hoop which itself swings about horizontal pivots in a second hoop, which can revolve round a vertical axis. (This is the same in principle as Bonenberger's apparatus). If the globe were at rest, the attraction of the sun and moon on the protuberant matter at the equator would bring it down, so that the axis would be vertical. This is imitated by a weight at the south pole, which produces this effect when the globe is at rest. But if it be set in rapid rotation this weight will not act directly; the *inclination* of the axis does not alter; but its *position* changes by a slow motion, successively pointing to different parts of space, as the axis of the earth does at the rate of 50″ in a year, and with it the intersection of the ecliptic and equator in a direction opposite to the earth's motion.

FRIDAY, JULY 28, 1854, AT 5 P.M.

ON THE STUDIES CONNECTED WITH GEOGRAPHY, AND ON THE RELATIONS OF THAT SCIENCE TO OTHER BRANCHES OF KNOWLEDGE. BY R. G. LATHAM, M.D., F.R.S.

The very fact of this and other lectures being delivered at this time and place, shows that the question of the order of sciences is not a mere speculative question, but one with a bearing on education. The subject under notice comes late, after mathematics, physics, chymistry, zoology, and botany. Does this mean that a boy is not to know that London is the capital of England until he is (say) a botanist? No, a distinction will explain what *is* meant.

There is a certain amount of information that we learn unconsciously and involuntarily, *i.e.* as we learn language. The memory of such words as *north* and *south* imply some geographical knowledge, though not scientific or systematic.

Now let teaching that approaches the method by which we learn in language things with words, be called *philologic;* and the teaching wherein we go from one subject to another *geometric*. Other names, (*systematic, sequential, discursive*, &c.) will do as well; but these illustrate the distinction.

The present lecture applies to the geometric method only.

The philologic and geometric methods have, then, application in the inverse ratio to each other. The early stage in which mathematical and logical teaching, according to the sequence of the system illustrated in the present lecture, finds place, coincides with the time of life when the greatest amount of loose and unconsciously-acquired knowledge picked up in the way that our knowledge of our mother tongue is picked up, finds its way into the youthful mind—and *vice versa*.

Again, the more favourable the social conditions of the individual, and the higher the civilization of his country, the better what may be called his *environment*,* *i.e.* the

aggregate of circumstances favourable to the acquirement of knowledge after the philologic fashion, and *vice versa.*

This is one preliminary explanation, another attaches itself to the words *geography* and *geographical.* Geography is no separate substantive department of knowledge, like (*e.g.*) physics, chymistry, &c. On the contrary, a great deal of it is supposed to be learned discursively, or after the philologic fashion, already; whilst what remains, is so much physics, or so much political history. Why, then, illustrate it by a lecture? Because it is a convenient text-word; and because this is the point where it comes into any systematic curriculum. See how independent chymistry, physics, and (still more) mathematics and logic have been of it; zoology less so, but still, much, as compared with the studies that follow. There are geology, history, &c. To these geography is basic or fundamental.

Can we connect the studies that form the subject of the present lecture by any other link besides that of requiring a certain amount of geography as a preliminary; geography, or a knowledge of the earth as the occupancy of man and animals; geography, or the general history of the planet *terra.* We can. A common historic character pervades them; historic, because sequences in time, sequences of cause and effect, are investigated. They fall into two primary divisions; *a,* History Proper, or Political History, which will be illustrated by my successor; *b,* Physical History, characterized by both its subject-matter and its method. The latter gives us geology, ethnology, archeology, all of which are investigated by what is termed the palontologic method, *i.e.* the argument backwards, from effect to cause. Political history rests on the testimony of human witnesses.

Does astronomy find its place here? In one of its aspects it certainly does. If the planet *terra* be part of a cosmos, terrestrial history leads to cosmic history.

Apply the physics, already mastered, to geography, and all that remains is only so much detail—easily comprehensible, and partially anticipated.

Apply the same physics, *plus* a certain amount of biological science, to geology, and much the same sort of residue remains.

Let the biological portion consist in so much human physiology, and ethnology is a light matter—in its physical and naturalist aspects, at least.

But now complexities begin, for natural or physical history passes into civil or political. The main branches of study lie in this transition, viz., language, comparative philology, history of useful and fine arts, literature, and science.. This is what we find if we look to the phenomena only. But there is more than this; there is the metaphysical aspect; there is æsthetics, by which we get our canon or standard of judgment; and there is mental philosophy, which the phenomena of language, the history of fiction, &c., eminently help us in. From this point forwards we move into the domain of my successor. The history of human cultivation gives us a general name for all that lies between the two extremes of physical and political history.

Now let us take a retrospect, and make a comparison. The first and last members of our sequence are recognised as branches of teaching—mathematics and political history. So is the transitional department between the two extremes just noticed. This, however, is recognised only in fragments; language is one of them. Of this a fragment is made the subject of a somewhat exclusive study. Along with this, by an accident, the history of fiction is recognised. Classical literature leads to this. All the rest is neglected.

Chemistry and biology have no place at all, or next to none.

Now if the place of the studies that make the subject of the present lecture be true, it follows that they are not the studies for boys, that they had better be taken late than early. Do this, and you make room for the important intercalation of the two neglected branches of chemistry and biology.

How does this touch the ordinary classical teaching of the present schools. It throws the details of classical learning—so far as they are classical at all, and not mere drill work—into the period of adolescence at least. It replaces the so-called advantages in the way of knowledge of the structure of language (in general) falsely (in my mind) attributed to the ordinary grammars by the special study of comparative philology taken later. But it does *not* ignore Latin and (or) Greek teaching at an early period. These are essential preliminaries.

The knowledge of language consists less in the amount of details known than in the familiarity of the knowledge of them. To insure this, teach slowly; to teach slowly, begin early. This can be done. Before physics comes in the elements of classical learning can conveniently be made the complement (so to say) of the teaching illustrated in the first lecture, logical and mathematical. They can be kept up throughout. The application, however, and full development come late.

The memory for facts and events, the taste and the imagination are cultivated by these studies—the imagination cultivated and chastened also.

FRIDAY, JULY 28, AT 8 P.M.

ON THE PUBLIC OR COMMON SCHOOLS* OF NEW ENGLAND, BY THE HONOURABLE HENRY BARNARD, SUPERINTENDENT OF COMMON SCHOOLS IN THE STATE OF CONNECTICUT.

By a public or common school in any one of the New England States, is not necessarily understood an elementary school for a particular class of the people, and disconnected from schools of a higher grade, or for other classes of the community. One or more of the public schools in most of the cities, and in many towns and villages, may and does embrace studies, which in this country or the Continent are pursued only in grammar-schools, or gymnasia. These schools are never—not in a solitary instance—intended solely for the poor or the rich. They are not called public schools, and yet, as is found in some countries, practically closed to all but a particular class, and never open to parents and strangers for observation. The public schools of New England are intended for all classes, as to occupation, education, or social position, and are subjected to the utmost publicity as to supervision of management and of observation, for the purposes of information, as to methods and results. They are public, because they are established, supported, and regulated by authority of law. The range of studies in them is not limited to the elementary branches of knowledge, but can, at the option of the people in the several towns and districts, embrace a preparation for college, or for the practical pursuits of life. They are not state or government schools, so far as the selection of teachers, the appointment of local managers, the course of instruction and the appropriation of money for their support are concerned. These important matters are entrusted to the parents. The organization of public schools, the territorial subdivision of the state into towns and cities, with certain corporate powers, is recognised in Connecticut. The towns are clothed with all the powers necessary to establish and maintain a sufficient number of public schools

* The lecturer announced, in his opening remarks, that he should confine his exposition of the organization and practical working of the public schools of New England to such points as his attention had been specially invited to by teachers and promoters of schools whom he had met in the Exhibition. He has consented on his return from the Continent, at the solicitation of many persons interested in the subject, to prepare a full report of his lecture, which will be published, together with a "Correspondence on the voluntary principle of education, as illustrated in the state of Rhode Island, at different periods of its school history."

of different grades as to studies, to educate all their children and youth, either with or without the agency of school districts, which are smaller sub-divisions of the territory of a town. Generally speaking, districts are entrusted with the building, repair, and care of school houses; the employment, through a committee, of teachers (subject to certain general regulations of the state and town), the length of the school term, and the course of instruction. The towns are required to raise by tax on the property, a certain sum for the support of the schools; but they may, and generally do, raise more than is required by law.

The extent and style of school accommodations are determined by the different localities, but the state aims to disseminate a knowledge of the best plans for the location, construction, seating, warming, and ventilation of this class of buildings. There are many poor, small, dilapidated, and inconvenient school-houses, but the present state of this department may be seen in the documents * in the American department of the Exhibition in St. Martin's Hall. It is found that the small additional sum required to furnish each pupil with a desk and chair of the best material and workmanship, over a cheap article, is repaid fourfold in the better care of the property, and in the moral results, as to manners, morals, and discipline.

The attendance of children at school is provided for—1. By having schools enough of different grades (as to scholarship, and not as to social position or wealth of the parents of the pupils). 2. By making these schools good and attractive. 3. By supporting them in such a way as to bring them within the reach of the poorest. 4. By regulations as to irregularity of attendance. 5. By judicious management on the part of the teacher. 6. By compulsion as to certain specified cases of neglect on the part of parents or employers. The main reliance is in the school habits of the people. Most New England parents would as soon be guilty of starving the body as the mind of a child. The actual attendance of children in school a portion of the year is in none of the New England States less than one in six of the whole population, and in most of the towns is over one in five. Great efforts are now making to secure the punctual attendance of at least one-sixth of the whole population in public or private schools.

The lecturer dwelt at some length on the organization of the schools,—on the modes adopted to secure and encourage good teachers, on the utility and mode of conducting teachers' associations, teachers' institutes and normal schools—in the supervision and support of the schools—on the various means resorted to. to bring the home and the school into harmonious action in behalf of the education of children and youth, and on the agency of the public press—of free or cheap libraries of good books, and the popular lecture, in carrying on the work of instruction begun in the school-room.

The lecturer concluded his remarks by commenting on some statements of fact and opinion in Mr. Tremenheere's "Notes on Public Subjects in the United States and Canada," which had already been very widely quoted, and which, unintentionally on the part of the author, gave, as the lecturer believed, a wrong impression as to the practical working and results of the American system of public schools, so far at least as the New England States are concerned. These schools are far from being perfect, and no one has been more ready, in his own sphere of activity, to point out their defects, or more diligent, by pen and voice, to discuss the remedies, or more anxious to search out the good schools of other countries, for the purpose of incorporating their excellences of organisation, material aids, and methods of instruction, into the system or schools of his own state. Still, when the opinion is expressed "after a wide survey of the working of the system in other besides the New England States," made in a hurried tour of fourteen weeks, extended over thousands of miles, with the attention drawn at the same time to the "press," "railroads," "agriculture," &c., the lecturer felt authorised to challenge a comparison between the three or four towns in New England specially mentioned in the "Notes" with the same number of towns, of the same population, in any other country of the world. If Mr. Tremenheere, or any one, will name a city or town in any part of Europe, of the same population as the city of Lowell, in Massachusetts (where it is asserted, on the authority of a clergyman, that "the public school system has undermined already among the population the doctrines and principles of Christianity")—where there are more churches better filled on the Sabbath—more Bible-classes conducted by clergymen—more Sunday Schools for religious instruction, better taught or better attended—more week-day schools, more liberally supported, a more thorough and extended course of instruction, and a larger attendance of children of all classes—and a working population more given to reading and the improvement of the means of self and mutual instruction, more temperate, more moral, or more saving of their earnings, and enjoying more of the comforts of a well-appointed and well-regulated home—the lecturer would set out forthwith to visit the same, and gather lessons to be applied on his return.

The Chairman, after expressing the great gratification he had received from the address of Mr. Barnard, containing such interesting and important information respecting the character and objects of school organisation in New England, hoped that, as this was a conversational meeting, and as there were in the room several foreigners specially connected with education, the meeting might be favoured with remarks from some of them; and he would, in the first place, call on Mr. Benedict, the President of the Board of Education at New York.

Mr. Benedict stated that after the very comprehensive account given by Mr. Barnard, he thought there was very little, if anything, which he could add, and considered it would be more interesting to hear the remarks of others, not Americans.

Mr. W. A. Shields, the master of the Peckham Birkbeck schools, said, he feared that even as Mr. Barnard had charged Mr. Tremenheere with looking at American education through spectacles, so he—the lecturer—might be charged with looking through *his* spectacles at the schools of this country. For instance, in vaunting of the ease with which a visitor could procure admission into a public school in the States compared with a public school here, Mr. Barnard was certainly labouring under a mistake. Mr. Barnard had already found easy ingress to his—Mr. Shield's school—and might rest assured that he had but to hand his card to the master of any of our public schools, to insure himself a prompt and welcome reception. Again, with regard to the comparison Mr. Barnard had drawn with the view of showing how much more conscientiously the children of the United States schools treated school furniture, than did the children of our schools, he (Mr. Shields) offered to show Mr. Barnard schools where the desks, forms, &c., were as well used by the children as the tables and chairs of their homes; and further, to convince him that the good treatment of the furniture at home, was in great measure a consequence of the training the children had received in using the fittings of the school. Mr. Shields thought that the censure of Infant schools incidentally implied by the lecturer was much to be deplored. In common with all those teachers who had experience of the working of well-conducted Infant Instruction, he was prepared to defend our Infant schools and teachers as most important elements in our public school system, and he regretted to hear from a man of Mr. Barnard's intelligence, the case put before the meeting as if it were Infant school instruction as opposed to home instruction. Schools,

* School Architecture in the United States. Trubner and Co., 12, Paternoster row. And the Reports on the Schools of Connecticut, Massachusetts, New York, and Philadelphia.

whether for infants or elder children, were not to be regarded as opposing, but as assisting home education, and the teachers were to be regarded as co-operating with the parents, and as bringing to the work of instruction a degree of skill which it could not be expected parents in general should possess. With respect to the female teachers, of whose accomplishments and abilities Mr. Barnard had spoken so highly, Mr. Shields thought it should have been stated that their employment in such numbers in the public schools of New England, arose from the fact that there, as here, the schoolmasters were the worst paid of any class of intellectual workmen, and he pressed upon the notice of those present who took an earnest part in the present educational excitement, and who regarded the formation of character as the great object of real education, that the controlling of boys, and their training in manliness of deportment and of feeling, was a work likely to be efficiently accomplished only by male teachers. In reply to the lecturer's criticisms on the schools of this country, Mr. Shields expressed his regret that, in consequence of the subject-matter of the lecture having confined the discussion to the means of building, fitting, and supporting schools, the great question of the moral influence of the education given in the public schools of America could not be entered upon. He would willingly have gone into that important subject, the more willingly because one party amongst our own agitators on the education question were constantly bringing before the public the statistics of American schools, and he did not hesitate to say that, however unable we might be to point to municipal or state provision for the systematic establishment and upholding of schools, that, measuring the worth of the country's education by the moral character of its people, it would be found that Old England could well stand the comparison either with New England or the oft-praised systems of any of the continental states. In common with Mr. Barnard, Mr. Shields regretted the paucity of teachers at the lectures generally, but he requested respecfully to suggest to the Society of Arts that two great errors had been committed in the arrangement of their lecture list. The hours at which most of the lectures were delivered were those at which it was impossible for teachers to attend; and further, the entire exclusion from the lecture list of the ordinary schoolmaster, (for whose office and for whose information Mr. Shields claimed more respect than the Council of the Society had been willing to accord), together with the omission of those subjects the discussion of which at present schoolmasters felt were important to the formation and progress of public opinion on the question of education, had caused teachers to regard themselves as not desired at these meetings. Mr. Shields earnestly pressed upon the chairman, and through him upon the Council of the Society, that men might be exceedingly eminent in various branches of science, and yet neither the chosen organs for expressing the schoolmasters' views, nor as capable as the schoolmaster himself of handling what must be regarded as his technical knowledge. He complained that the deference usually shown even by the wisest to the workman in his knowledge of his own art had been refused to the schoolmaster in his; and he asserted that, considering the moral character of the schoolmasters as a body, and the zeal and success with which many amongst them had laboured, the Society might, without any diminution of its dignity, have availed themselves of the schoolmasters' help; whilst he looked upon the feeling of injury with which the minds of teachers had been filled as a thing gravely to be deplored.

Mr. Hugo Reid remarked that the difficulty of getting access to public schools in this country (where such difficulty exists) might be attributed to a very reasonable cause, not yet alluded to—the desire to avoid that interruption of lessons and distraction of the attention of the pupils occasioned by the entrance of visitors. He should be disposed to consider, that if a public school was open at all times to the committee, secretary, and appointed visitors or inspectors, enough was done to ensure adequate inspection; that other visitors should be admitted at the discretion of the directors or teachers; and that publicity, or openness to all and sundry, would be a serious impediment to the school-work. Nor did he conceive that the mixing of classes in the public schools could be, in this country at least, carried to the extent described in the New England Schools; but the presence of the youth of the richer classes in the United States in the same schools as those of the poorer orders, showed one fine feature in these schools—that the latter had the means of a first-rate education within their reach; and he thought it would be a great improvement in our educational arrangements if provision were made in every district for carrying on to the highest point the education of such of the humbler orders as evinced superior general capacity or any peculiar aptitude; in short, that the poorest everywhere should have access to the best education of which they were capable. He commended much the arrangement in the New England Schools, by which each pupil had a separate seat and desk—or at least not more than two were at one seat and desk. He thought also that we might take a hint from the Americans on Teachers' Associations, which might be so useful for discussing educational questions.

Mr. Yapp said that a discussion on the comparative merits of the common school system of New England and the systems in use in this country would, he conceived, be productive of little benefit unless the fundamental *difference* that existed between them were borne in mind. The form and construction of the schoolhouse, and the character of the apparatus and books made use of, were certainly not unimportant; but the moral tone of the establishment, the principle upon which it was founded, was of so much more importance as to be beyond all comparison. We had heard from Mr. Barnard that the *sons* and *daughters* of all classes of society sat side by side in the common schools of Connecticut—the instruction being not too good for the child of the labourer, nor too poor for the children of the upper classes. That the presence of children brought up by careful mothers, in well-managed homes, should exercise a beneficial influence over the school, as Mr. Barnard asserted it did. was certainly to be expected, and the mingling of the young of all classes must tend in a great measure to cultivate manly and independent feelings as well as to prevent that awkwardness which is so embarrassing to people brought up in a narrow and restricted circle. In this country, until our habits and prejudices should be entirely changed, we could not possibly have any system approaching that of the Common Schools of New England. The social separation of the classes in this country, was so decided, that such a mingling even of the children of the various classes could not possibly be looked for during the present century. Mr. Yapp believed that the difference thus pointed out rendered it next to impossible to introduce anything like the New England system into this country, and he believed that the fact was an unfortunate one for ourselves. Education was far more valuable in its indirect than in its direct effects, and the very best system of instruction would fail to have any important effect upon a nation,—would fail to take root in the hearts of the people,—would fail in its highest and noblest aim, unless based on a pure, honest, and unselfish principle. Now, the strong line of demarcation drawn in this country, diminishes the faith which the people have in education; it tends to make them believe, not that they are to have their children educated with the view to make them independent men and women, but rather with the view to make them fitted for their station in society; a feeling which certainly does exist to a very great extent in the minds of the people of this country. a feeling which, although not often admitted or even seen by the philanthropic educationalist, is constantly acting against him, and frequently counteracts

all his efforts, and renders abortive all his good intentions. Until an alteration is effected in our national character —however much we may admire the common schools of New England—we must admire them as institutions belonging to another system, and as incompatible with our habits, our feelings, and our prejudices.

The CHAIRMAN said, that although the meeting had not had the benefit of any observations from Dr. Krag, of Norway, yet that gentleman had kindly promised to place in the hands of the secretary a report on the educational system of his country, which would probably appear in the Society's Journal. The chairman then proposed a vote of thanks to Mr. Barnard, which was carried by acclamation.

SATURDAY, JULY 29, at 5 p.m.

The Secretary regrets that Professor Creasy has been unable to write an abstract of his lecture "On the Relations of History, Biography, and Political Economy to Other Branches of Knowledge," for this week's Journal, but trusts to being able to do so for the next number.

SATURDAY, JULY 29, at 8 p.m.

ON INDUSTRIAL SCHOOLS. By JELINGER SYMONS, A.B. CANTAB.

The lecturer begged that his views on this subject might not be received as expressing those which may be entertained by the Committee of Council on Education, or as put forth in his official relation to it, as one of its inspectors; but solely as his own notions, stated on his own responsibility.

He said that, whether rightly or wrongly, a widely-spread opinion prevailed, that plain, useful, practical instruction, suitable to working-class children, was a good deal sacrificed to scholastic subtleties and high flights of learning, apprehended by few, and of real use to none of them. He said that, for his own part, whenever he found children of the labouring classes well grounded in Christian principles and elementary secular learning of a really useful kind, such as they could readily apply to the daily duties and daily wants of life, he was very tolerant of the absence of all knowledge of technical divinity, and no wise dismayed if they knew nothing of the tributaries of the Euphrates, or never heard of Agamemnon. It was, in his opinion, a far graver blot when he found them ignorant of the practical meaning of a parable, unable to describe the chief places and products of their own county, the uses of metals and woods, or at a loss in mental calculation.

Dean Dawes, and many worthy coadjutors, had done a vast deal in improving education *in* the schoolroom, but more still remained to be done in order to improve it *out* of the schoolroom. It was the province of industrial instruction to complete the work. It was desired to make schools for the poor self-supporting, but the only sure way of effecting this was so to organise them that they should fit poor children to support themselves, and that the education should, both morally and physically, minister to the wants of the class taught. Labouring people form pretty accurate notions of the value of what they pay for, and perhaps make no great mistake in holding the value of the present instruction given at a cheap rate.

Mr. Symons dwelt largely on the impossibility of effectual moral training within the four walls of a schoolroom. The virtues instilled there were solely conventional and negative. Mr. Stow had advocated the *play*-ground, as giving freer scope to the natural propensities of the child, and to the appliances of correction. He, however, preferred the *work*-ground. In the first place, whilst mutual aid was an offence in the schoolroom, it was a duty, and soon became a habit in the work-ground; and with it came the long train of those fruitful benevolences and brotherly feelings which were the best tests of real Christianity. Mr. Symons illustrated the practical working of this principle by facts drawn from experiences at the Highgate National School and Farm, which he had just visited and highly praised. He dwelt largely on the benefit of associating school knowledge with labour-life, at the earliest age—so as to familiarise the child with the practical utility of what he learned, whilst invigorating both body and mind, and making instruction and industry aid each other. It was impossible to impart the spirit of the labourer without labour. He guarded the audience against the misapprehension of a passage in Professor Moseley's last report, which he thought condemned monotonous and toilsome occupations only, such as tailoring and shoemaking, for very young children.

It was essential to the success of all industrial schools to give the parent and child some participation in the fruits of his labour. All efforts not based on this principle had failed, and ought to fail; for the child should be taught from the first that toil has its reward, and that "the labourer is worthy of his hire." Mr. Symons went into many details as to the modes, management, expenses, and profits attending farm schools, and touched also on the means of applying industrial training to town schools. He condemned the system of teaching girls fancy work, and gave instances of unsuitable and high-flown knowledge, half-acquired, and ridiculously misapplied, by girls who had been thus taught, and who went afterwards into places utterly unfitted for their work. He denounced these "puppyisms of education," as no less cruel to the girls than detrimental to the utility of domestic service; and advocated in its stead a regular system of instruction in plain needlework, washing, ironing, household and dairy work, with baking and cooking wherever practicable; and it was often a great deal more practicable than managers of schools were willing to imagine, till they tried it.

It might be objected that difficulties would arise in obtaining fit teachers. This difficulty existed already, and applied to the choice of all ministers of all arts; but it was one which discretion and demand would soon overcome. As regarded the conjunction of spade husbandry with school teaching, that excellent institution, Kneller Hall, was now sending out men, who were daily trained in labour, and felt it no degradation to take a spade, and work with their boys, some of whom he believed were equal in acquirements to the best in-door schoolmasters in England.

Again, it was objected that out-door work shortened the time for instruction in school, but the lecturer thought this a great benefit, and a vast improvement upon the mistaken system of keeping children poring for so many hours over books, whereby their mental faculties were blunted, and their natural taste for knowledge often nauseated.

Whether for boys or girls industry should be so combined with mental study in all common schools as to make instruction an apprenticeship to labour. This would remove the great cause of the shortness of the stay of children of the labouring classes at school. The Census returns of education were greatly exaggerated, and the numbers swollen by the returns from dame and other schools, where nothing was effectually taught; but enough appeared to prove that working-class children, on the average, do not remain above two years at school.* This fatal drawback to valid education will never be surmounted so long as schools for the poor defer preparations for labour, and prevent industrial training. Mr. Symons quoted cases as at the Hagley School, where the school period had been prolonged far beyond the usual age, by the junction of the latter element, although threepence per week was charged; and he contrasted it with the shorter stay of children in the Bluecoat School at Hereford, which was excellent and gratuitous, but non-industrial.

Mr. Symons spoke in high terms of the success of labour discipline in the work of Reformatory Schools for the worst

* See note at p. xxx. of Mr. Routledge's edition of the Census.

class of criminal children, as evidenced at Parkhurst, Hardwicke, the Philanthropic, and also at the Gloucester and other Industrial Ragged Schools. These and other experiments in Union Schools had amply proved that there was a money profit from land, if judiciously cultivated; but money profit was a secondary consideration. The proven merit of industrial schools was, that they far excelled ordinary schools in fitting poor children for those duties and avocations which were the only legitimate objects of the education which this busy and industrial empire was every year more justly and more loudly demanding for its people at the hands of their educators.

MONDAY, JULY 31st, at 5 p.m.

ON THE DIGESTION OF KNOWLEDGE. BY THE REV. C. MARRIOTT, B.D., FELLOW OF ORIEL COLLEGE, OXFORD.

It is not pretended to treat the subject systematically, but only to call attention to it, and throw out a few hints that may be useful to some teachers and learners. Facts are presented to the mind in almost excessive abundance on all sides, and the methods of communicating knowledge have been of late much improved by various systems of teaching, and many mechanical appliances. But nothing can supply the place of a certain quiet and continued exercise of the mind, by which it becomes familiar with a subject, and gradually assimilates to itself what it has acquired from without. Acquisition itself is aided by some little exercise in placing and applying what is learned.

In arithmetic, for instance, very much may be done towards a thorough understanding of the subject, such as renders forgetting either impossible or at least remediable by a free mental exercise on the simplest cases. In vulgar fractions, the rules of which are often learned and forgotten several times over, true practice on the smallest numbers would fix every principle indelibly in the mind, and very simple diagrams, either linear, or, still better, in the form of squares and rectangles, would place them effectually before the eyes.

The same principle may be extended to other rules of arithmetic, and in general to everything connected with numbers. It is very useful in learning any branch of science to make calculations on any part of it which gives room for calculation; and, even in matters of common life, we should improve much in practical knowledge by familiarising ourselves with the actual quantities of all ordinary weights and measures. In history, also, it is necessary to have ideas of distance, scenery, and various natural objects, which are best attained by actual observation, but which may be helped out, in default of such observation, by making the most of neighbouring rivers, hills, &c., compared with their appearance in maps and drawings.

The use of the globes is, perhaps, the best instance in ordinary practice of the kind of study that has been recommended. But this is rendered much more serviceable by a little actual observation of the starry heavens. A night on the top of a coach, or the deck of a vessel, has often taught more astronomy than many lessons. A half revolution of the stars, traced by the eye, is to the globes what a first journey is to the map. The sun's place in the heavens is at first a difficult thing to imagine. It seems to us as if the stars changed time and place with reference to the sun, and not the sun with respect to the stars.

The division of the common sun-dial is a point that is often noticed without being thoroughly understood; but a simple section of the globe, parallel to the horizon, shows the divisions of the horizontal dial by the intersections of the circle with the several meridians.

Learners, no doubt, especially young ones, will sometimes ask irrelevant questions, but they must not be altogether discouraged in questioning. "Wait patiently for the answer" is a good rule, but it must not be taken in such a sense as to imply that no answer is to come. The answer may be that the question is wrongly put, as, "What makes the sun go round?" or it may be rightly put, as in the simple question, known as having suggested such great discoveries to Newton, "Why does the apple fall from the tree?" He added another, "Why does not the moon fall to the earth?" and the two meeting in one point, elicited the most important discovery of natural science.

The same questions, however, had been put before, and had received a somewhat similar answer. Plutarch, in his work on the Man in the Moon (*De Facie in Orbe Lunæ*), suggests that the moon is attracted towards the earth, but kept from falling to it by the centrifugal force arising from its motion. He also mentions that Cleanthes of Samos supposed the earth itself to move in the ecliptic, and round its own axis. But the theory of the moon thus stated remained dead and unfruitful, a mere suggestion, because it was not worked out by actual calculation. It remained for Newton to show that the celestial bodies, moving as they were then known to do, in ellipses, *must* be acted on by centrifugal force, varying inversely as the square of the distance; and the identity of this force with that of gravity is established in the case of the moon by a very easy calculation. The moon's mean distance being about 60 semi-diameters of the earth, the force of the moon will be one 3600th part of what it is at the earth's surface. And since a body falls 3600 times as far in a minute as it does in a second, the deflection of the moon from the tangent in a minute, if caused by gravity, will be nearly the same as the fall of a heavy body in a second, or 16 feet and a fraction. That such is the actual deviation, appears by considering the size of the moon's orbit, and the part of it described in a minute.

One use of such calculations is to learn the value and use of figures in general, in order not to be deceived by them, but to know what they really prove. They are also very serviceable in correcting our ideas of facts, and detecting inaccuracies in our knowledge. (A few instances were here given.)

But digestion does not belong to figures only. It has place in moral and practical knowledge of every kind, and even in such knowledge as is in a great degree above our understanding. In history it is of the greatest importance, and may be obtained by dwelling on particular periods, or courses of events, with some attention to collateral illustrations from geography, biography, antiquities, and contemporary works of literature and art. Even fiction, judiciously employed, may render important service in giving young minds an interest in historical periods, and aiding older readers in forming a lively impression of events, characters, and customs.

We are not indeed to attempt to make every child a premature philosopher. Our object should be to familiarise the mind with a few of the certain facts and real characters of history, in their relation to external moral truths, or to the progressive history of mankind. The combined history of Christianity, civilization, literature, science, and constitutional government, is a living history, and interesting to every intelligent mind, the moment that its relations are apprehended. Principles are most easily first discovered in the aims of a great man; and a child may be led to consider, Why did he do this or that? How did he succeed? What had he to do? What difficulties to overcome? Where did he learn to strive for good beyond his age? What was the influence of his work in after ages.

These are questions beyond the first enquiry of the child, Was he good or naughty? But they are those into which that enquiry may be turned, by following it out into its several bearings. It is only thus that the mind can be relieved from the disgust of its historical disappointments. The best example we have is in the Old Testament history, which is not only living but satisfactory, when we view it as the education of a nation for the introduction of the gospel, and all tending to that

point. This, well learned, is a good first lesson in the philosophy of history.

For modern history we cannot point to any such distinct consummation. Yet we can see that the nations are learning the principles of peace, unity, forbearance, justice, equal rights, and all reasonable liberty of conscience, of international arbitration, of association of individuals and nations, for mutual benefit. The Church also is made the means of carrying on a spiritual education of mankind, in connection with this moral development, and the efforts of good men for both, and the working of events in forwarding or delaying them, one of the deepest interest to all who can appreciate them. The future of the world may be beyond our grasp, but the future of our own country depends much on our own energy, especially in the work of education. The contents of this building show that we are not asleep, and it is to be hoped we shall be more and more awake to the necessity of educating every Englishman, and the whole of every Englishman, body, soul, and spirit. We do not want mere manufacturing machines, money-getting machines, talking machines, fighting machines, or preaching machines, but *men*, who love God and their kind, and who will leave the world happy, if, so far as their own work is concerned, they leave it better than they found it.

In conclusion, as an Oxford man, he might be excused in saying that the Oxford system of education is of a digestive character, exercising the mind on history, with its living accompaniments of literature; on philosophy, with ancient text-books; but free criticism, and now on modern law and history, and on physical as well as mathematical science, with intervals for reflection between the academical terms. And what some people consider antiquated learning deals, in fact, with the real elements of the spiritual, intellectual, and civil history of mankind, carried down to the highest point of the old civilization.

It is a mistake also to think that Oxford wishes to exclude any from the benefits of her education. She wishes to communicate all that she has, and what has now been done by the legislature will not be regretted or resisted so far as it is an opening of those benefits to additional students. All that she desires is to preserve that education which she has, and to have the liberty of teaching as truth what she holds as certain truth. She deprecates only such measures as will destroy the very benefits which it is their object to communicate and extend.

MONDAY, JULY 31, AT 8, P.M.

DISCUSSION ON THE PHONIC AND PHONETIC SYSTEMS OF TEACHING TO READ IN THE ORDINARY PRINT.

DR. R. G. LATHAM, who occupied the chair, said that he considered his duty was limited to introducing Mr. Alexander J. Ellis, who had come from Edinburgh to explain the Phonetic system, and to regulate the discussion, which must be strictly limited to the educational point of teaching to read, and not branch out into proposals for changing our orthography. The best test was the numerical:—In how many hours, spread over what period, could pupils be taught to read by such or such a system. He had thought as badly of the present, and as well of a phonetic orthography as any man, but there had been exaggeration in both opinions, which facts had materially modified. He had, however, no hesitation in avowing himself strongly in favour of the phonetic system of teaching to read ordinary print. Dr. Gregory, of Edinburgh, not having been able to be present had addressed him a letter, which he proceeded to read as follows:—

MY DEAR SIR,—Had I not been compelled to remain in Edinburgh for our graduation on the 1st of August, I should have made a point of attending the Conversazione on the Phonic and Phonetic Systems at which you are to preside.

I have for a good many years taken much interest in the subject of phonetics, especially as applied to education, and I have the honour to be President of the Reading Reform Association, suggested by Mr. Ellis.

I trust, therefore, that I may be permitted to add my testimony to that of Mr. Ellis, who is to address the meeting, in favour of the very great practical advantage to be derived from the use of phonetic reading as an introduction to reading the usual character.

I agree entirely with Mr. Ellis, in regard to his views of the theory of this very remarkable and unexpected result; but I would particularly wish to point out to those interested in education and desirous to diminish the labour and shorten the time at present required for learning to read, that even supposing the theoretical views of Mr. Ellis and other phoneticians to be disputed, there can be no dispute as to the fact, that all teachers, both here and in America, who have employed phonetics as a step to ordinary reading, are unanimous in ascribing to it the important effect of enabling the pupil to attain in a very much shorter time than is usually required, a much greater degree of accuracy in reading, pronunciation, and spelling; with this additional advantage, that the pupil, from the beginning, feels that he is advancing by his own efforts, and consequently learns with pleasure. This is certainly a contrast to what used to be the case, and it is not going too far to say, that in consequence of the peculiarity just noticed, both the intellectual and moral faculties of the pupil are directly and materially benefitted.

Having seen and examined the results of various experiments in the method of teaching to read recommended by Mr. Ellis, I have acquired a firm conviction that it is a great and thoroughly practical improvement, and worthy of the best attention of all teachers.

Believe me, yours faithfully,
WILLIAM GREGORY.

MR. ALEXANDER J. ELLIS observed that if the Phonetic system he was going to explain, had had for its object to effect a change in our spelling, it could not have come on for discussion in this place, and that the term Reading Reform had been invented to distinguish it accurately from any reform in spelling. Mr. Symons had on Saturday stated, as a result of the last educational census, that children remain in school on an average only two years, the time which it now takes them to learn to read. Indeed the Rev. Canon Moseley, as an Inspector of Schools, had calculated from his own data, that one-half of those who frequent schools for the labouring classes, *leave* them unable to read. The consequence was that no proper education could be given the children. Parents would not leave their children at school, and to solve the great problem of inducing them to do so, we must educate their children better in the same time. This we can effect if we can materially reduce the time spent over reading. This is what the phonetic system professes to do, requiring only one year at half-an-hour daily, instead of two years. It might never have occurred to any one not previously possessed with the idea (mistaken if you choose so to call it) of changing the spelling, to throw aside the common alphabet and use a totally different one, at first, to enable a child to read the present spelling. Most of the improved systems of spelling attempted to reduce our orthography to some phonetic order by diacritical marks, &c., but the strictly phonetic system was separated from all these by the great gulph of a totally new alphabet. It taught the children at first as if no other alphabet existed. The alphabet chosen consisted of 40 letters, and as the old had only 26, this might seem a complication. But each of the 40 had only one sound, and the 26 were really more nearly 200, when increased by the diagraphs which constituted true letters, and were then very variable in signification. Thus, not to refer to *ough*, observe the difference of sounds represented by *ear* in *ear, bear, beard, heard, heart*. These changes must be learned and understood by the pupil by means of a classification, but in the ordinary phonic method this was attempted to be done for the pupil, who remained *passive*; on the phonetic plan the pupil was led to perform it *actively* for himself. The 40 letters represented the elements assigned by Dr. Latham in his *English language*, and by Walker in his *Dictionary*, the phonetic analysis not pretending to scientific refinement. Mr. Ellis then repeated the sounds, and illustrated their combinations by means of a chart. The children were taught a single sound first as *ee*, and then

another as *s*, and then combined them into groups as *see*, *ees*, so that they felt themselves advancing from the first, and they never had to unlearn or relearn what they once acquired. In about 6 weeks, at 2½ hours a week, the pupil generally masters the *primer* and can read *any* phonetic word slowly but surely. He next has to be brought to read with *fluency*. This is a work of time, differing greatly in different pupils. But it is of paramount importance to the success of the system, that this stage should be reached. Mr. Ellis adduced examples in his own family, where children of the same age passed rapidly or not to reading in ordinary print according as this point was or was not reached. It might take 8 months to finish this stage, and then in a few weeks the transition to ordinary print was made so rapidly and easily as to be almost incredible in some cases. This result was totally unexpected, nor was its philosophy at first understood. It seems that as ordinary readers will read a phonetic book almost without instruction, so fluent phonetic readers grasping words as a whole, knowing the value of the greater part of the ordinary letters, insensibly co-ordinate the varieties of spelling, reducing them to their familiar phonetic standard, and thus for themselves actively and intelligently perform the requisite classification. This process is therefore exceedingly valuable for its general effect on the intellect. But it was at first feared that the children so taught would not learn to spell well in the ordinary way. Here practice, again, outrun theory. The best phonetic readers were found the best ordinary spellers. The reason was, first, that they had, in learning to read, learned to classify spelling for themselves, and secondly that, being acquainted with a true phonetic alphabet, they never thought of using the ordinary alphabet phonetically. To satisfy the chairman's desire for numerical results Mr. Ellis then adduced some experiments—one by Mr. Williams, in Edinburgh, in which a phonetic class outran a class taught on ordinary plans, though starting a year later; and one by Miss Baxter, of Boston, U.S., where, a class being divided, the phonetic division far outstripped the other. The details of these experiments were quoted from the official reports of the teachers. The reports of the Legislative Committee of Massachusetts in 1852, recommending the general adoption of the phonetic system for teaching ordinary reading and spelling, was also read. The Reading Reform Association hoped to establish an experimental class for London teachers during this autumn. But no great instruction was required to teach the teacher, for in almost all the experiments that had been made the teacher had acquired sufficient knowledge from the publications of the association; and in Mr. Williams's experiment the teachers were monitors, children of eleven or twelve years of age, who had acquired the power of teaching in a very few lessons. If, indeed, the best teachers in a school would teach reading, the time would be vastly reduced; but what the association hoped for was that the parents should themselves become teachers, and by sending the children to school *able* to read, render available those means of education which this Exhibition now proved to exist so abundantly.

Major Beniowski mentioned his experience of teaching Poles to read ordinary print by means of a phonetic alphabet.

Mr. Jelinger Symons felt some doubts as to the use of two alphabets in teaching to read, especially on children of low intellect. He advocated the phonic system, with which teachers had informed him they could teach more rapidly than before. He thought it exercised the child's reason more.

Mr. John S. Reynolds, of the Home and Colonial School Society, stated that the phonic system had been used and discontinued there, but by their modification of it children were taught to read well in from two to two and a half years.

Dr. Wilson, of Chelsea, had been opposed to the phonetic system before entering the room, but had found reason to alter his opinion. Perhaps learning two ways of representing the language might be of similar advantage to learning two languages, whereby the pupil became better acquainted with both.

Mr. E. Carleton Tufnell, although not acquainted with the phonetic plan, was, from what he had heard, impressed with its advantage. He was acquainted with the phonic system, and knew a case where, on it having been discontinued, on account of a change of masters, the pupils had privately kept it up for themselves; and he thought respect should be paid to the opinion of children thus clearly expressed.

Dr. Gladstone detailed a successful experiment he had made some years ago in teaching pupils at a ragged school at Clapham to read in the ordinary print by means of the phonetic system.

Mr. Dunning explained the system pursued at the Home and Colonial Schools. 1. The children were taught to observe the shape of letters. 2. They learned their names. 3. Their usual powers. 4. Their combinations with short sounds. 5. Their long value with double consonants. 6. The anomalous sounds and accurate reading. 7. Intelligent reading. 8. Reading with expression.

Mr. W. A. Shields thought sufficient attention had not been paid to what schoolmasters were doing, without reference to any particular system.

Several other teachers and gentlemen addressed the meeting, and Mr. Reynolds offered to have an experimental class, to try the phonetic system, at the Home and Colonial Schools.

Tuesday, August 1st, at 8 p.m.

On the Aims and Instruments of Real Education. By the Rev. C. H. Bromby, M.A., Principal of Cheltenham Normal College.

The lecturer dwelt for a considerable time upon the great aim of the educator. He must stand in awe as he contemplates in every child a virgin block of marble which his chisel may spoil, or out of which he may strike out with the implement of education the divine ideal of a perfect man. In every infant there is a germ capable of perfection, rendering him more intelligent, more loving, more happy. The end of real education is not so much to impart instruction as to develope the faculties. It should embrace the wants of man's complex being as a thinking, feeling, intelligent, and moral being. The different periods of a child's life must be also observed. The first symptom is observable in its beginning to perceive. It longs for light, and is pleased with colour. A mother's look and word awaken a spiritual life; her love excites a kindred instinct. Then comes a consciousness of the outer world; then the faculty of speech, memory, imagination. Much was said of the necessity for a trusting confidence in a parent's perfection, as for a long time the parent is in the place of God. The trainer of infants should be a person of boundless sympathy. In the second period of childhood, the education should be essentially religious; but religious instruction is not religious education. It should embrace the playground, the boy's world, where the educator will be a child with a child. Punishment should consist in the moral sense of disgrace rather than in the animal sense of pain. Pain is cheap to a brave boy, who, without flinching, can make his appeal as a hero to the secret sympathy of his compeers. The lecturer passed on to advocate in earnest terms the education of the productive classes. The children of the poor are the children of the state, which is bound to take the work into its own hands, if religious denominations decline it; or to supplement it, if they attempt it. As the quality of popular education has advanced, the term of school-life has been diminishing, because all that the parents value can be more easily procured; a most lamentable result. The large absence of children from school is no proof of the defective cha-

...ures, but an argument in favour of ...e most ready and effective means ...ing all negligent parents of claim The state has a right to protect ...ible pests—to require vaccination; ...; and to cultivate the wandering The future well-being of England the education of our productive ...ery of steam-power tends to equalize . The raw material is easily transferred if superior skill is brought to work ...ay discover too late that we shall be ...ts of the world.

...of education may be thus classified:— ...oom, in its furniture, companionship

...instruction, class or collective.

...nd the expedients of his moral govern-

...head, schools should be characterised taste. and abound in objects of true ...ypes of what might be expected in the ...ome.

...nd head, prejudices have been excited ...st the gallery or collective method, by ...roduction of new objects foreign to the ...ing-man. To avoid this, let it be con- to the analysis of sentences and the ...g, and to the explanation of principles ...a real instrument of mental science. If ...f reading books, which in the principles ...al science, and the familiar laws of the comprehended what is necessary for school gallery would not be idle if only called ...te and amplify their text. Nor is there ...t so powerful for unfolding the beautiful ...ed Writ, or inculcating its holy precepts.

lecturer dwelt considerably upon the im- ...ion of normal schools. To fail here is to ...ve the entire system which engages the ...Privy Council, the active exertions of all ..., and whatever else is represented by the of £200,000. No policy can be more short- ...state parsimony in this department. Voluntary ...eir behalf do not come home to men's feel- ... at a distance. And yet upon Institutions so supported, what depends? they have to send ...apable of raising the condition of the people, their taste, infusing prudential desires, and ...vident habits. It is theirs to arrest the pro- ...temperance, cover the land with better cottages ...clothed peasantry—to thin the alehouses and churches of God in the land,—theirs to curb the ...uperism, and, in a word, to make the great work- more intelligent, more religious, and therefore ...and prosperous. We need men whose minds ...with the influence of study, but recognizing a ...all honourable labour, manual as well as mental; deep and earnest faith in Christianity, and in ..., too, as its ancillary instrument that opens out ...d wider channels for its diffusion. These will be who will act upon society with all the magic of thought, transcendant faith and love, and so ...ver the land the warmth and light of real and Christianity.

OIL OF THE CAHOUN OR PALM TREE OF BRITISH HONDURAS.

General Manager of the British Sperm Candle ...ny (Fairfield works, Bow), writes:—

...have formed a very favourable opinion of the value ...cahoun-nut oil (of which you were so kind as to ...me a specimen) as regards its application to the ...facture of candles. I forward to you herewith a ...of candles which contain 50 per cent. of the oil; and, having burnt another, I find that the light is white and steady. I consider the cahoun-nut oil superior to cocoa-nut oil for making composition candles,—for the odour is more pleasant, and the compound is less oily. The best cocoa-nut oil is now selling in London at 51s. per cwt., and I think there would be no difficulty in selling the cahoun-nut oil at a higher rate in very large quantities."

Home Correspondence.

THE BOOKS EXHIBITED AT ST. MARTIN'S HALL.

First Article.

Sir,—In making a few remarks on the books which have been collected at the Educational Exhibition of the Society of Arts, amounting in number to many hundreds, I feel at once the necessity for classifying them; and, as my leading division, I take

Books for the Educator.

It is now generally acknowledged, and beginning to be acted on, that the educator—the professional educator, at least—must have some special preparation to qualify him to teach. The idea that any one who knows the subject matter of instruction is therefore also qualified to teach it, is well nigh worn out. Besides a knowledge of the subject to be taught, the teacher must have some acquaintance with the nature of the being to be educated, and with the principles of educational methods. This point is now pretty well established; and accordingly, during recent years, many books have been published with the view of assisting and guiding the teacher in preparing for his office. The parents, too. as well as the professional teacher, need guidance to qualify them for their duties as educators; but this want is not yet fully felt or recognised, and our educational literature as yet affords few treatises specially adapted for those who hold the most powerful educating influences in their hands. In looking over the various books on education in the Exhibition, and comparing them with those of a few years previously, as ten, or twenty years ago, two circumstances of a highly gratifying character at once strike us—first, the much greater number of books on education now issuing from the press; and, second, their more systematic and scientific character. It is also very pleasing to find that the writing of educational treatises is not now confined to those who have only a theoretical knowledge of education; but that those who have practical knowledge of the teachers' work are coming forward with the results of their experience.

First amongst the books for the teacher, both for the extent of the work and value of the matter it contains, stands "The Minutes of the Committee of Council on Education," now consisting of many volumes, full of interesting and important matter on almost every educational question —whether we consider the subject as connected with public policy, or the comparative efficacy of this or that method of instruction or training. This very valuable work is too little known, too little consulted by teachers; all classes of whom would profit by frequent examination of its varied contents. Along with "The Minutes" we may class the following works, all bearing more or less on the great question of "the Education of the People":—"Public Education," by Sir James K. Shuttleworth, Bart.; "The Condition of Poor Children in English and German Towns," by Joseph Kay, M.A.; "An Improved and Self-paying System of National Education," by the Rev. R. Dawes, A.M., Dean of Hereford; "The Reports of the National Society;" "Education Reform," by Thomas Wyse, M.P.; "The Advocate of National Education," by Mr. Lucas; "The Society of Arts' Report on Industrial Instruction;" "Hole's Essay on Mechanics' Institutions (Society of Arts' Prize Essay)."

The following works exhibit the state of education in different countries:—"Cousin's State of Education in Holland," translated by Leonard Horner; "Report to the

Secretary of State on the Training of Pauper Children;" "Cousin's Report on Public Instruction in Prussia," by Sarah Austin; "The Education of the Poor in England and Europe," by Joseph Kay, B.A.; "Dr. Stow's Report on Education in Europe to the Legislature of Ohio, in 1837;" "Dr. Bache's Report on Education in Europe to the Trustees of the Girard College, Philadelphia, 1839;" Horace Mann's Report of an Educational Tour in Germany, &c., in 1844," reprinted in this country, with notes by Dr. Hodgson; "National Education in Europe, by Henry Barnard, LL.D. Second edition, 1854." "The Educational Institutions of the United States; their Character and Organisation. Translated from the Swedish of P. A. Siljeström, M.A., by Frederick Rowan." Of these by far the most full and complete, and also the latest, is the work of Mr. Barnard, which we hope the Exhibition will be the means of making better known in this country, where it is calculated to be of the greatest service, as well as in the United States. It is somewhat striking that four different bodies in the United States should, within the period of sixteen years, have sent highly-distinguished and accomplished citizens of the Union—Stowe, Bache, Mann, and Barnard—to examine and report upon the state of public education in Europe—a very significant fact as to the extreme importance attached to the subject of education by the citizens of that great republic. Mr. Barnard's great work on National Education in Europe should be placed side by side with the Minutes of the Committee of Council, in every public library throughout the kingdom, as a most valuable work of reference on a variety of educational questions.

School Architecture, and the *Warming and Ventilation of Schools*, are subjects of very great importance. Economy, adaptation of the building to its end, and the health and comfort of teacher and pupil, are dependent upon sound views on these points. Many instances can be pointed out where committees and architects have combined in wasting large funds on lofty halls and an ornamental exterior, and produced an interior quite inadequate for the purpose for which the building was designed. Such evils have been somewhat diminished since the publication of the early volumes of the "Minutes of the Committee of Council," and "Joseph Clarke's Plans of Schools and School-houses," which contain valuable plans and suggestions. Mr. Stow's work on "The Training System" contains a chapter on these subjects, on which also some information may be found in the Plain Directions of the British and Foreign School Society," and n the American work entitled "The School and the Schoolmaster," in which there is an excellent chapter on the Schoolhouse. But all these contain but scanty notices on the subject when compared with Mr. Barnard's works "School Architecture; or Contributions to the Improvement of Schoolhouses in the United States;" 416 pages, with 300 wood-cuts—fifth edition, 1854—and "Practical Illustrations of the Principles of School Architecture"—176 pages, with 163 wood-cuts. Another American work, "Rickson's School Builder's Guide," shows the great attention paid to the construction of schoolhouses in the United States.

In examining Mr. Barnard's work (but it is only a hasty glance we have been able to take of it) two things must at once strike those acquainted with British schoolrooms—the very great attention paid to warming and ventilating, and the arrangement of the desks. With respect to lighting, warming, and ventilating, the following general principles are laid down as essential to be adhered to:—

"6. An arrangement of the windows so as to secure one blank wall, and at the same time the cheerfulness and warmth of the sunlight at all times of the day, with arrangements to modify the same by blinds, shutters, or curtains.

"7. Apparatus for warming, by which a large quantity of pure air from outside the building can be moderately heated, introduced into the room without passing over a red-hot iron surface, and distributed equally to different parts of the room.

"8. A cheap, simple, and efficient mode of ventilation, by which the air in every part of a school-room, which is constantly becoming vitiated by respiration, combustion, or other causes, may be constantly flowing out of the room, and its place filled by an adequate supply of fresh air drawn from a pure source, and admitted into the room at a right temperature, of the requisite degree of moisture, and without any perceptible current." "Practical Illustrations," &c., pp., 9-10. It is manifest, from the descriptions given in this work of the structure of many school-houses in various parts of the United States, that systematic provision is made for warming and ventilating, in the original design for a school building, before a brick is laid; that the ventilation is made independent of doors and windows, and of the care and attention of the teacher; and that, while a sufficiency of pure air is admitted, cold draughts are carefully avoided. Of how many schools in our country can this be said?

Again, the arrangement of the desks is admirable. Instead of long desks and forms, with six or eight pupils at each, the generality of desks and seats are short, being constructed for two only. It is laid down as an essential principle, that there shall be "a chair or bench for each pupil, and in no case for more than two, unless separated by an aisle," with desks to correspond; but it is also distinctly stated that "Single desks are generally to be preferred to double ones. The whole expense for room and desks is about twenty per cent. more." And in many schools, the desks are single, each pupil having, at both seat and desk, a clear open space on each side of him. Any one practically acquainted with the work of school education, will at once appreciate the value of such arrangements in aiding in the preservation of discipline,—promoting quietness and order, and forwarding individual development. If this plan is carried out generally in the United States schools, it speaks volumes for their state of superior discipline and efficiency in forwarding the highest object of intellectual education—enabling the individual to develope his own powers. The noisy, bustling, stunning, confusing place we call a school, may at present suit certain classes of our young, and is better for them than no school at all; but neither can such a system with monitors, nor the simultaneous system, be regarded as any thing but temporary makeshifts, or adapted only to the very young in certain situations. Whenever there is to be a real power of self-education developed—wherever the pupil is to do something more than answer a question, or listen to a teacher rousing and exciting him; whenever, in short, the pupil is to be trained to put forth his own powers, mechanical arrangements are requisite which shall enable him to be undisturbed by his neighbours; and for this great end, as well as for aiding good discipline, and enabling the pupil to write, draw, and do his other work with care and neatness, a desk and seat to himself are of the greatest advantage. Every architect, and every school library should be in possession of a copy of Mr. Barnard's work "On School Architecture." We regard it as one of the most valuable additions our Educational Literature has ever received.

In classifying educational books, we now come to those designed more especially to instruct the educator in the principles and practice of his art, and supply him with the necessary knowledge. These may be arranged in five divisions. 1. Books developing the general principles of *Pedagogy*, meaning by that term, the whole science and art of education, and of course including *training*, as well as *instruction*;" 2. Books to inform the teacher on the various subject-matters of instruction; 3. Books on school methods; 4. Books on the methods of teaching special subjects; 5. Journals.

There are but few treatises in the English language on the general principles of education; certainly, in not more

than two or three of these is the subject treated comprehensively and scientifically; the most of them are partial and discursive-like, essays on education. Among the most valuable are "Home Education," by Isaac Taylor; "Bainbridge on Early Education;" "The Teacher," by Jacob Abbott; "Fireside Education," by S. G. Goodrich (Peter Parley); "Mrs. Child's Mother's Book"—Theory and Practice of Teaching, by D. Page (an admirable work); "American Education, its Principles and Elements," by Mansfeld; "The Teacher and the Parent," by S. Northend. These, excepting the two first, are American; but Mrs. Child's book, "The Teacher," and "Fireside Education," have been reprinted in this country. They contain much valuable matter; the first three, especially, are eloquent, forcible, and replete with happy illustration. In this list, also, we must place two other works, the most recently published works on general education in this country, which aim at a more systematic treatment of the subject; on which account we also give a list of their contents. "The Principles of Education," an elementary treatise, designed as a manual or guide for the use of parents, guardians, and teachers, by Hugo Reid: Contents: 1. Nature of the Being to be Educated. 2. Objects of Education. 3. Discipline. 4. Moral training. 5. Instruction. 6. Intellectual training.—"The Philosophy of Education, or, the Principles and Practice of Teaching, by Thomas Tate, F.R.A.S. Contents: 1. Method, as applied to Education. 2. The Intellectual and Moral Faculties considered in relation to Teaching. 3. Methods and Systems of Teaching. It is of very great importance that the young teacher should be trained to consider his subject as a science, consisting of a variety of mutually dependent parts, and that he should be in possession of a text-book, developing the several principles of the science progressively and systematically, so that he shall come to know them and understand them as constituting one harmonious whole, and be able to apply them with force and consistency. Such a view of his subject, even though given in mere outline, or not very well filled up, is valuable, as suggestive to his own mind. English Educational Literature (whether British or American) is rather deficient in systematic treatises on Education, and we therefore hail the attempts just mentioned to present the subject in a more complete and scientific form.—There are few English works expressly drawn up to instruct the teacher in the matter in which he has to instruct others; though there are several excellent French and German works of this character, to which we shall afterwards refer. English works of this class for the teacher will be alluded to along with the books for the pupil on the several subjects, as the English teacher must derive his information chiefly from the books designed for the upper forms of schools or the Colleges.

The following are the leading works on *School Methods*. Most of them contain also observations on the mode of teaching special subjects, and a little on the general principles of Education:—"Wood's Account of the Edinburgh Sessional School;" "Dunn's Principles of Teaching;" "Hand-book to the Borough-road Schools;" "Stow's Training System and Normal Seminary;" "Bishop Short's Hints for School-Keeping;" "Ross' Teacher's Manual of Method;" "Richard's Manual of Method;" "Jelinger Symons' School Economy (chiefly on Moral Industrial Training);" "Willm on the Education of the People, edited by Nichol;" "Young's Teacher's Manual;" "Wells and Unwin's Normal School and Model School;" "Collin's Teachers' Companion;" "Llyod's Teachers' Manual;" Sullivan's Lectures and Letters on Popular Education;" "Potter and Emerson's School and the Schoolmaster (New York); and the "Minutes of the Committee of Council on Education," which contain in every volume most valuable matter on school methods. Of these Mr. Symons's "School Economy," and Mr. Richard's "Manual of Method" (by the Head Master of the National Society's Central School), are very valuable works. The most celebrated in the preceding list is Mr. Stow's "Training System," a work which has now reached a ninth edition. This very able work is chiefly devoted to an exposition of the system pursued in Glasgow in connection with the Normal Seminary of which Mr. Stow has so long filled the office of Secretary with the greatest zeal, energy, and ability. While Mr. Stow's book is chiefly devoted to the advocacy and explanation of the simultaneous system, it is full of valuable remarks and suggestions on the art of teaching, and may be profitably studied even by those who do not approve of that system either as developed by him, or in any other form. From the first educational awakening in the early part of the present century, caused by the labours of Lancaster and Bell, and of the promoters of Sunday schools, the educational methods in common schools have exhibited three phases—the monitorial, the simultaneous, and the pupil-teacher form. The efforts of Bell and Lancaster, and of the societies which arose out of these efforts, gave a stimulus to the monitorial system, and it spread rapidly; ere long its defects became apparent, and it sunk in public estimation, particularly on the Continent. The zeal, extensive operations, and writings of Mr. Stow and the Glasgow Educationists pushed the simultaneous system into favour, much increased by its showy character and the apparent economy with which it was worked. In course of time its defects began to be perceived, and in 1846 the Committee of Council on Education instituted another system, capable of combining every good point in the monitorial and simultaneous methods, with a power of imparting real education infinitely beyond what either of these systems can accomplish. We are now in the transition state from the simultaneous to the pupil-teacher system, and when the latter has received its full development, we may congratulate ourselves on having the means of rendering the education we give in our common schools really efficient. While we admit the efficacy of the simultaneous method in certain circumstances, and would desire to see it occasionally employed in every description of school, it cannot be denied that it has many and serious defects when taken as the sole or principal method. The most rapid and perfect teaching, whether instruction or intellectual training, is effected by one teacher with one pupil; as the pupils are more numerous the efficiency of the *instruction* diminishes, and that of the *intellectual training* in a still more rapid proportion. The great cause of the wretched results of the education given in our common schools is, the too great number of learners in proportion to the teachers. The only practicable remedy is that offered by the Committee of Council on Education in their minutes of 1846. The measure there brought forward—well-trained pupil teachers—went to the root of the evil. "Properly carried out," as a recent writer observes, "it would work a revolution in elementary education, extend greatly the instruction, render some intellectual training possible, improve the discipline, promote the comfort of the teacher, do away with that rough wholesale driving miscalled 'education,' in which numbers, totally different in age, capacity, progress, nature, must be treated as all alike; from which flow harshness and injustice in dragging all along together, utter failure to many in the objects for which they are sent to school, the repressing of all individuality, and the tendency to grind all down to one dull uniformity." There are many most valuable suggestions for carrying out this system in the volumes of the "Minutes of the Committee of Council;" but there is a want of one work devoted to the subject. He would do a great service to the cause of elementary education who should do for the pupil-teacher system what Mr. Stow has done for the Glasgow system. This is a desideratum in our educational literature.

We have few books designed to give directions for the teaching of special subjects. Among the most worthy of notice in this class are, "Suggestive Hints towards Improved Secular Instruction," by the Rev. R. Dawes, Dean of

Hereford; "Lessons on the Phenomena of Industrial Life," by the same author; "The Analysis of Sentences, Explained and Systematised," by J. D. Morell, A.M.; "The First and Second Phonic Reading Books," and "Exercises in Arithmetic, after the Method of Pestalozzi," under the sanction of the Committee of Council on Education; "An Introduction to the Art of Reading—Irish School Series;" "Marcel on Language; Model Lessons for Infant School Teachers and Nursery Governesses." This is a department of educational literature to which many useful additions might be made.

Educational Journals form another department of the literature for the educator; and there is now a considerable number of such periodicals published in this country. First, we must refer to four Journals, now discontinued, but well worthy of a place in the teacher's library:—"The Quarterly Journal of Education of the Society for the Diffusion of Useful Knowledge," 10 vols. "The First, Second, and Third Publications of the Central Society of Education," 3 vols. "The Educational Magazine, 8 vols." "The Quarterly Educational Magazine and Record of the Home and Colonial School Society," 2 vols. The first of these is a very valuable work, containing articles by the late Dr. Arnold, Professor De Morgan, and other of the most eminent scholars and educationists in Britain, on the most important questions in the wide range of the science and art of pedagogy. The existing educational journals are the following:—"The English Journal of Education" (monthly); "The Scottish Educational and Literary Journal" (monthly); "The Educational Times" (monthly); "Papers for the Schoolmaster" (monthly); "The School and the Teacher" (monthly); "The National Society's Monthly Paper;" "The Educational Expositor" (monthly); "The Sunday School Teacher's Magazine, and Educational Record" (monthly); "The Church of England Sunday School Quarterly Magazine;" "The Educator, or Home, the School, and the Teacher;" "The Quarterly Journal of the Congregational Board of Education." There are also numerous Educational Journals published in the United States. Of these Journals, we think it will at once be admitted, that "The English Journal of Education" is *facile princeps*. It contains the best and most elaborate papers on important educational questions, including excellent essays on the modes of teaching particular subjects; and it gives more complete accounts and analyses of new books than any other educational Journal. More especially adapted to teaching in upper schools, it yet contains matter which all teachers should study, whatever class of scholars be under their care. We should urge every teacher to read this journal, and to possess himself also of the past volumes; it is now in its 12th year, and the whole series forms, perhaps, the most valuable educational work in the English language. Of the other Journals, several are excellent, but more specially adapted to certain classes of teachers; it is almost a pity there are so many; but this is perhaps unavoidable where we are so much split up into classes or cliques. If we might make a suggestion, we think several of these journals would be greatly improved were they to condense wordy long-winded communications of their correspondents, abridge greatly their notices of matters of merely ephemeral interest, occupy themselves more with "what to teach and how to teach it," and give fuller criticisms and analyses of new educational works; whilst some would rise greatly in the estimation of their readers, were they to infuse a little fair-dealing and impartiality into their accounts of books.

We have thus taken a hasty glance at the books and journals in the English language, specially designed to teach the teacher, and think that we may congratulate ourselves on the rich amount of such educational literature which we possess, as well as on the decided tendency towards a higher tone and more scientific form which that literature exhibits. Much yet remains to be done; but much has been done, and well done, and that in but a very few years.

Yours, &c. A MEMBER.

MONUMENT TO SHAKSPEARE.

Sir,—I looked with some interest to your last Journal to ascertain whether any active sympathy had been awakened among the members of the Society of Arts, to the proposal of Signor Chardigni, contained in the previous number, of erecting a gigantic monument to Shakspeare, according to certain suggestions of his own, into the merits of the details of which I will not now enter, but will content myself by cordially assenting to the general proposition, with the expression, at the same time, of my satisfaction that the admitted want of a national monument to Shakspeare, which has been so often before suggested, has at length, and very appropriately, been brought under the particular notice of the Society of Arts; and, with the daily evidence we have of the ability and hearty disposition of that Society to carry out any appropriate or useful work, I do now hope to see the want efficiently supplied.

Strange does it seem when we reflect that as a nation we have hitherto rested content, devoid of any substantive embodiment of the "form and habit as he lived," of our greatest poet and dramatist—but it probably may be accounted for in the very fact of the all-towering and transcendant character of his lofty genius, which, shining "like a bright and particular star," has induced his countrymen hitherto, in his instance, to depart from the course ordinarily adopted with those whom they have delighted to honour, and so we have rather sought reverentially to treasure up the numberless quotations and sayings adopted from his works which abound amongst us, and have become so grafted, as it were, both on our language and phraseology, as to be "familiar in our mouths as household words."

I remember that the *Home of Shakspeare* was recently purchased, and thereby saved from destruction by a committee of individuals, backed by the subscriptions of an appreciating public—and when I further remember that this Society numbers amongst its members one of the most active of the members of that Committee, and a gentleman, too, so identified with the literature of Shakspeare, in the person of Mr. Charles Knight, I feel we need not look beyond the walls of the Society for an appropriate name to take the initiative in the matter. My humble subscription, I beg to say, is ready whenever applied for. Hoping that may be soon,

I am, sir,
Your very obedient servant,
JOSHUA W. BUTTERWORTH.

Fleet Street, July 25, 1854.

Proceedings of Institutions.

Hackney.—The Sixth Annual Report of the Literary and Scientific Institution congratulates the members on the present position of the Institution, and expresses the belief that by continued exertion the present number of members may be increased. To the lectures, which are considered to form probably the most attractive feature, the Committee have, in a few instances, charged the Members a small sum for admittance, so as to enable entertainments of a superior character to be given, which could not otherwise have been done. This charge was most cheerfully met. The library has been much added to during the year, by the purchase, at a comparatively small cost, of standard works, at the sale at the Aldersgate Institution. The Reading-room continues to be well attended. Some of the classes are not so satisfactory as they might be, but the French class has proceeded with regularity and undiminished numbers. The German class has also continued its meetings. Both these classes are conducted by gratuitous teachers. From the balance sheet it appears that the receipts of the year have been £524 6s. 10d., and the expenditure £488 8s. 3d., leaving a balance on the year of £35 18s. 7d., enabling the

amount to be expended in part liquidation of a debt now reduced to £24 18s. 6d.

MARYLEBONE.—On Monday afternoon, July 10th, a public meeting of the gentry and inhabitants of Marylebone was held in the theatre of the Literary and Scientific Institution, Edward-street, Portman-square, for the purpose of adopting energetic measures for extending the benefits and influence of the Institution. The Right Hon. Lord Broughton presided on the occasion, and was supported by Lord Robert Grosvenor, M.P.; Sir B. Hall, and Lord Dudley Stuart, the members for the borough; Mr. Ewart, M.P.; Mr. Oliveira, M.P.; Sir James Hamilton, Bart.; Mr. James Bell, M.P.; Dr. Sayer, Mr. Joseph Grote, Mr. Clement George, Mr. Jacob Bell, Mr. Whitmore, Mr. Nicholay, Mr. Alderman Salomons, Mr. Ure, and other gentlemen connected with the district. The chairman, in opening the business, expatiated upon the advantages which literary and scientific institutions conferred upon the minds of the people, and his astonishment and regret that, after an existence of twenty-two years, such an institution, in the great and wealthy district of Marylebone, should be on the eve of dissolution for want of proper support. Lord Robert Grosvenor then moved the first resolution, approving the principle, "That institutions for promoting intellectual improvements have a direct tendency to elevate the social position of all classes of society." This resolution having been seconded by Sir Benjamin Hall, Bart., M.P., was carried unanimously. Mr. Ewart, M.P., moved the second resolution, to the following effect—"That while the higher classes are provided with clubs and learned societies, and while the establishment of free libraries under the sanction of the legislature, is rapidly extending the influence of mental culture to persons in the humblest walks of life, similar advantages are equally necessary for the middle classes, to enable them to keep pace with the general advancement of the age." Mr. Wells seconded this resolution, and it also was carried unanimously. Lord Dudley Stuart then proposed the following resolution—"That the Marylebone Literary and Scientific Institution, which was founded in the year 1832, is calculated to afford the desired advantages, by furnishing to persons engaged in business avocations the means of rational and intellectual recreation; and that it is highly desirable to adopt energetic measures to extend its usefulness, and to place it on a more stable and permanent foundation." Dr. Ure seconded this resolution, which was carried *nem. con.* Dr. Sayer moved the fourth resolution, to the effect, "That the stability and permanent prosperity of the Institution might be most effectually secured by a systematic and united effort to relieve it from its existing liabilities, and to increase the number of annual and life members, and that the meeting should assist the committee in promoting such object." Mr. James Bell, M.P., seconded this resolution, which was also carried unanimously. On the motion of Mr. Jacob Bell, seconded by Lord Dudley Stuart, a vote of thanks was awarded to the noble chairman. The subscriptions and donations contributed after the meeting amounted, in the course of a few days to nearly £300; and it is expected that the debt, which rather exceeds £[illegible], will shortly be liquidated.

ROYSTON.—A special general meeting of the members of the Mechanics' Institute was held in the reading-room, on Monday evening fortnight, J. Phillips, Esq., in the chair. The secretary, Mr. John Warren, read an interesting statement, showing the result of the labours of the sub-committee appointed for conducting the preliminary business in connection with the Institution building and the Museum. The new rules, framed for the guidance of the managers of the building and the museum, were passed unanimously; and the following gentlemen were, on the motion of Mr. [illegible]ering, seconded by Mr. G. R. Higgins, elected trustees for life:—Messrs. Valentine Beldam, John George [illegible]ham, Henry Fordham, John Fordham, William Thomas [illegible], John Phillips, Richard Pyne, Henry Thurnall. The secretary then briefly alluded to the proceedings of the Conference between the Society of Arts and the Institutions in Union with that Society, held in London, on the 4th July, which was attended by the secretary as representative of the Royston Institute. One subject, deeply interesting, which was discussed at the Conference, the secretary introduced to the members assembled at this special general meeting, viz., the encouragement of, and arrangements for, the visits of artizans to the Paris Exhibition of 1855. After a brief discussion, it was resolved, on the motion of Mr. Jachlin, seconded by Mr. A. Sward, jun., that this meeting, highly approving the object, earnestly hopes the committee will lose no time in zealously co-operating with the Society of Arts for the promotion of so laudable an undertaking. In a few days, therefore, a sub-committee will be appointed for this special purpose, and arrangements will be made for receiving weekly deposits from artizans, &c. After a vote of thanks to the chairman, the meeting separated.

MEETINGS FOR THE ENSUING WEEK.

MON. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—The Dean of Hereford "On Common Things and School Fees."
Society of Arts Educational Exhibition. St. Martin's Hall, 8.—Hon. and Rev S. Best, "On Village Reading Rooms and Libraries."
Entomological, 8.

TUES. Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Rev. W. Mitchell, "On Teaching Crystallography."

WED. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Mr. Chadwick, "Points of the Sanitary Construction and Management of Schools."

THURS. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Mr. Knighton, "On Stow's Training System of Education adapted for Large Towns."

FRID. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Mr. William Ellis, "On Economic Science."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Mr. Herbert Mackworth, "On Science in the Mines."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 27th July, 1854.

Par. Numb.
373. Exports and Imports (France)—Account.
380. West India Loans—Account.
391. Civil List Pensions—Account.
401. Slave Vessels Captured—Return.
410. Russian Loans—Return.
241. Bills—Bribery, &c. (as amended by the Select Committee, in Committee, on Re-commitment, and on consideration of Bill as amended).
242. Bills—Acknowledgement of Deeds by Married Women.
243. Bills—Marriages (Mexico).
244. Bills—Friendly Societies (as amended by the Select Committee).
245. Bills—Midland Great Western Railway of Ireland (Barome's Contributions).
Canada (Legislative Proceedings)—Papers.

Delivered on 26th July, 1854.

Public General Acts—Cap. 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, and 37.

Delivered on 28th July, 1854.

345. City and Borough Police—Abstract of Return.

Delivered on 29th and 31st July, 1854.

378. Thames Marshes—Report from the Select Committee.
399. Churches—Correspondence, &c.
408. Metropolitan Parks, &c.—Return.
277. & 325. Accidents in Coal Mines—3rd and 4th Reports
390. Vessels and Tonnage—Return.
402. Customs' Duties—Return.
413. Public Works (India)—Copy of a Dispatch.
415. Metropolis Water—Abstract Return.
427. Drainage (Metropolis)—Copy of a Letter.
428. Bermudas—Return.
246. Bills—Crime and Outrage (Ireland).
247. Bills—Cinque Ports (amended).
248. Bills—Militia (amended).

Delivered on 1st August, 1854.

400. Revenue, &c. (Ireland)—Accounts.
403. Ventilation of the House—3rd Report from the Committee.
407. Valuation (Ireland)—Return.
417. Miles Sweeny—Correspondence.
249. Bills.—Usury Laws Repeal.
250. Bills—Militia (Ireland) (amended).

251. Sale of Beer, &c. (Lords amendment.)

Delivered on 2nd August, 1854.

57 (6). Trade and Navigation—Accounts.
412. Friendly Societies bill—Report from the Committee.
420. Customary Payments (St. Andrew, Holborn, &c.)—Return.
252. Bills—Merchant Shipping (Lords amendment).
254. Bills—National Gallery, &c. (Dublin) (No. 2).
255. Bills—Militia Ballots Suspension.
256. Bills—Public Revenue and Consolidated Fund Charges (No. 2).

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette*, *July 28th*, 1854.]

Dated 10th June, 1854.

1281. I. Braithwaite, Gower street—Roofing.

Dated 19th June, 1854.

1328. T. M. Fell, 74, King William Street, City, and W. Cooke, Curzon street, May Fair—Bottle and bottle-stoppers.

Dated 30th June, 1854.

1438. J. Mc Gaffin, Liverpool—Iron casks and cisterns.

Dated 6th July, 1854.

1479. S. Harvard, and J. Womersley, Stoke, Holy Cross—Drying seeds, and feeding millstones.
1481. J. Arrowsmith, Bilston—Consuming smoke and obtaining motive power.
1483. P. A. Le Comte de Fontaine Moreau, 4, South street, Finsbury—Breaking-in horses. (A communication.)
1487. J. H. Johnson, 47, Lincoln's Inn Fields — Agricultural Machinery and motive power. (A communication.)
1489. J. E. Mc Connell, Wolverton—Railway-wheels, axle-boxes, and brakes.
1491. W. Pole, Storey's Gate—Railways.

Dated 7th July, 1854.

1493. W. Lacey, Aston-juxta-Birmingham—Copper rollers, cylinders and tubes.
1494. A. Morison, Inchmichael, N. B.—Protecting agricultural produce from disease.
1495. G. and W. Beard, Cannon street—Needle depositor.
1496. J. Ross, Keighley—Compounds of chocolate, cocoa, &c.
1497. A. V. Newton, 66, Chancery lane—Pump. (A communication.)
1498. J. L. Norton, Holland street, Blackfriars—Turnstile counting apparatus.
1499. J. Ellisdon, Liverpool—Lounging chairs.
1500. H. R. Cottam, 20, Argyle square, King's Cross—Horse mangers.

Dated 8th July, 1854.

1502. W. Robinson and R. Crighton, Manchester—Rolling metals.
1506. F. L. Bawdens, Pimlico—Soap.
1508. E. Lord, Todmorden—Cleaning and carding cotton.

Dated 10th July, 1854.

1510. S. M. Saxby, South Lambeth—Making fast and letting go cords, &c.
1512. G. A. Biddell, Ipswich — Cutting vegetable and other substances.

Dated 11th July, 1854.

1514. E. Wolverson, Aston-juxta-Birmingham—Lock.
1516. M. Walker, Horsham—Cooking stove.
1518. C. F. Moore, Southampton—Apparatus in lieu of water-closet.

Dated 12th July, 1854.

1522. F. A. Gatty, Accrington—Printed receipt stamps.
1524. O. Maggs, Bourton—Thrashing machines.
1526. J. Knowelden, 7, Church road, Battersea—Furnaces.
1528. R. Armstrong, Hall street, City road, and J. B. Dew, Pentonville—Consuming smoke.
1530. J. T. Marshall, New York—Reefing and furling sails.
1532. J. Robertson, Kentish Town—Consuming smoke.
1534. A. E. L. Bellford, 16, Castle street, Holborn—Preserving animal substances. (A communication.)

Dated 13th July, 1854.

1536. A. J. Lane, Surbiton—Breech-loading fire-arms.
1538. J. Greenwood, and R. Smith, Bacup—Finishing textile fabrics.
1540. E. Travis, Oldham—Pressure guage.
1542. R. Bodmer, 2, Thavies inn—Application of vitreous material to machinery. (A communication.)

Dated 14th July, 1854.

1546. W. Bishop, Boston—Labelling spools, &c.
1548. M. Wilberg, Lund (Sweden)—Composing type, &c.
1550. J. Mc Gaffin, Liverpool—Iron bridges.
1552. A. P. Price, Margate—Distillation of wood, &c.

Dated 18th July, 1854.

1572. J. Barlow, Accrington—Extracting gluten from wheat.
1574. M. C. Hill, Dublin—Bonnets.
1576. R. Hornsby, Grantham—Thrashing machines.
1578. G. Twigg, and A. L. Silvester, Birmingham—Stamping metals.
1580. W. B. Johnson, Manchester—Steam engines.
1582. P. A. le Comte de Fontaine Morean, 4, South street, Finsbury—Zincography. (A communication.)

Dated 19th July, 1854.

1584. J. C. Browne, Cheltenham—Camp bedsteads.
1586. J. Lougley, Leeds—Turning pails, tubs, &c.
1588. M. Michell, Stoke Newington—Consumption of smoke.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1606. Nicholas Callan, Maynooth College—A means by which iron of every kind may be protected against the action of the weather, and of various corroding substances.—21st July, 1854.
1607. A. E. L. Bellford, 16, Castle Street, Holborn—Breech-loading fire-arms. (A communication.)—21st July, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed July 28th, 1854.

247. Henry Wickens, 4, Tokenhouse Yard, Bank—Improvements in the mode of inter-communication in railway trains.
256. Alfred Daniel, Moorfields, Wolverhampton—Improvements in locks and handles for the same.
275. Pierre Joseph Meeus, Paris—Improvements in the manufacture of threads from or with gutta percha, and in ornamenting the same.
297. Henry Olding, Lambeth—Improvements in stoves and fire-places.
313. François Vouillon, 12, Princes street, Hanover square—New process of protecting the silvering of looking glasses.
314. James Samuel, Great George street, Westminster, and Alexander Woodlands Makinson, of New Palace Yard, Westminster—Improvements in drying flax, straw, and other fibrous substances.
316. Eugène Boileau, Holford place, Clerkenwell—Improvements in producing raised printing surfaces.
426. Edward Taylor, King Horn, N.B.—Improvements in gill-heckles or combs for treating fibrous materials.
446. Charles Cowper, 20, Southampton buildings, Chancery lane—Improvements in furnaces. (A communication.)
468. William Edwards Staite, Manchester—Improvements in the treatment and preparation of madder and munjeet for dyeing and printing.
500. Simon Roussel, Paris—New system of painting and colouring glass, being an imitation of old and new church window glasses, called typophanic.
504. Thomas Truscott and Thomas Palmer Baker, Portsea—Improved arrangement of steam engines adapted to screw propulsion.
576. Peter Armand le Compte de Fontaine Moreau, 4, South-street, Finsbury.—Improvements in the manufacture of cards.
686. Moses Poole, Avenue Road, Regent's Park—Improvements in preventing alterations of bank notes, cheques, and other documents.
724. Frederick William Harrison and Henry Graham William Wagstaff, Pollard's Row, Bethnal Green—Improvements in the construction of wicks for candles.
762. William Gossange, Widnes—Improvements in the manufacture of certain kinds of soap.
886. David Tannahill, Glasgow—Improvements in lithographic and zincographic printing.
984. William Edward Newton, 66, Chancery Lane—Improvements in moulding, preparing, and finishing articles and fabrics made of compounds of caoutchouc, gutta percha, and other substances.
1220. Owen Rowland, Lloyd Square—Improved apparatus for damping papers, labels, and other like articles.

Sealed August 1st, 1854.

266. Frederic Henry Sykes, Cork street, Piccadilly—Improved apparatus for supplying or feeding boilers with water, applicable to raising and forcing liquids for other purposes.
292. Peter Trumble, Huddersfield—Improvements in paper-hangings.
318. Pierre Joseph Meeus, Paris—Improved apparatuses for planting grain and seeds, depositing manure, and for performing operations connected therewith.
322. William Dray, Swan lane—Improvements in the construction of portable farm and other buildings, part of which improvements are applicable to the construction of cart and waggon bodies and other structures.
364. William Asbury, Birmingham—Improvement or improvements in forks for agricultural and other purposes.
1180. Joseph Hipkiss, Dudley Port—Improvement or improvements in puddling furnaces used in the manufacture of iron.
1244. Walter Crum, and Peter Stewart, both of Thornliebank, Renfrew—Improvements in machinery and apparatus for beetling or finishing woven fabrics.
1254. William Thomas Parkes, Aston-juxta-Birmingham—Improvement or improvements in the manufacture of the ornamental parts of gas-fittings.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
July 28.	3623	Improved Telegraph Pipe	James Votie	Manchester.
Aug. 1.	3624	The Amempton Sociable (Carriage)	Edwin Kesterton	Long Acre, London.

Journal of the Society of Arts.

FRIDAY, AUGUST 11, 1854.

Educational Exhibition.

Previous to the opening of the Exhibition the Secretary to the British and Foreign School Society addressed circulars to the Secretaries of all the British Schools throughout the country, suggesting that it afforded a favourable opportunity to Local Committees to render a kindness to their teachers, whether masters or mistresses, by allowing them to attend the Exhibition free of charge to themselves. In consequence of this suggestion the managers of the Blaina and Cwm Celyn British Schools, Monmouthshire, have placed five pounds at the disposal of their teachers for this purpose.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £1,025 15s. 6d., including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

THIRTEENTH LIST.

M. Corr Vander Maeren (Brussels) £1 1 0

ABSTRACTS OF PAPERS, LECTURES, AND DISCUSSIONS.

Thursday, August 3rd, at 3 p.m.

On Teaching the Deaf and Dumb. By Dr. W. R. Scott.

The lecturer commenced by showing how much all persons who had the faculties of hearing and speech learned from the society in which they were placed and with which they could communicate. Language was the great means through which this communication was carried on, and as the deaf and dumb were deprived of this great gift, they were, as a consequence, shut out from all the privileges which it bestowed on man. The first object, then, in their instruction was to put them in possession of the means of communion with their fellow-men, either in its written or spoken form. The earlier teachers had chiefly laboured to give them *speech*, and the Germans still spent much time in teaching articulation, while the English, French, and American schools principally endeavoured to teach them the use of language in its visible or written form. The lecturer gave a brief sketch of the rise and progress of the art, and showed the modifications which the system received in different countries. He did not conceive that articulation could be taught with advantage to the great mass of the deaf and dumb, while to those who had an aptitude for learning it, he thought it a proper branch of study. He gave a lengthened account of *Sign Language*, which, as far as it was natural, was the most important auxilliary in instructing the deaf-mute; but conventional or arbitrary signs must be used with caution, and were not by any means of such value as some teachers had supposed them. Pictures, models, and illustrations of various kinds were of the greatest use, as they addressed themselves to the eye,—the great inlet of knowledge to the mind of the deaf-mute. The collection of such aids to teaching as were now being exhibited in this Hall, he felt to be a sure index of the advance the art of Pedagogy was making, since it showed that teachers were not now content to place their instruction before their pupils in a cold and formal lesson of words, but brought the objects themselves or their pictures into the school-room, so that the knowledge conveyed might not be verbal but real.

The lecturer then explained the value of the finger-alphabet, and pointed out its function as a means of communication as inferior both to speech and writing, since it had neither the rapidity nor the power of emphasis of the former, and wanted the fixed character of the latter. But to the deaf-mute it was valuable, since it was ready at all times, and did not involve the carrying of pencils and tablets.

The lecturer then proceeded to show the mode in which the language of words was taught, and illustrated, by several examples, the manner of teaching nouns, adjectives, verbs, &c. He also pointed out the studies to which pupils might be introduced, and illustrated his method of teaching geography, which was not by beginning with asking the child what geography was, but by teaching him to comprehend a map of the school-room, then one of the grounds of the Institution; then extending it to a map of his native country, and so on, till he led him through a course of general geography. He also showed the method employed in leading the deaf and dumb mind to a knowledge of religious truth; and concluded by enforcing the necessity for direct teaching in the case of a deaf-mute. For while ordinary children might gain information from the conversations of social life—the teaching of the church, &c., the deaf-mutes could not, and were solely dependant upon school instruction for elevating them into communion not only with their fellow-men but their Creator. Without instruction, life to them was little more than an isolated bondage, and futurity a blank; but educated they emerged from this dreary loneliness, became conscious of their humanity, and could lift in eloquence their eye to heaven, and thank God they were what they were.

Friday, August 4th, at 5 p.m.

On Teaching the Idiot. By the Rev. Edwin Sidney.

The experience of the present day tends to show that there is no malady incident to man, which is not capable of some compensation, palliative, or remedy. We can not only instruct the dumb and the blind, but we can soothe the insane and teach the idiot and the cretin. The successes of Dr. Guggenbühl with the cretins, could not fail to excite to similar exertions on behalf of the idiot, which have been, wherever tried, found successful. This class of unfortunates includes those who have their understandings undeveloped, or developed only partially and feebly, or who have lost them without becoming insane. Their numbers are found to be fearfully great; and so science is well employed in casting its light on the modes of their rescue from their sad condition, or the stoppage of their deterioration. Mr. Sidney therefore begged the favourable attention of the audience, while he detailed the *principles*, *methods*, and *results*, of those meritorious efforts in their favour, which he had witnessed with a constantly increasing conviction of their value, both as a Christian duty, and a study of the mysterious connection between organization and the manifestation of mind.

1.—The expression *manifestation of mind* was used because it is a leading principle with those engaged in

teaching the idiot, that he does possess in every case a mind like that of men in a normal condition, but that its faculties are obscured or fettered by a defective bodily envelope. No correct definition of idiotcy has yet been given, and the various terms applied to designate it are very synonymous. The idiot is, in truth, ἴδιος, solitary, standing *alone*, with a mind so paralysed by ill-organism as to be unable to exhibit, in the usual degree, intelligence, will, power, or moral feeling, yet having certain sensations and perceptions. The bodily frame is always in an abnormal condition of health, and wanting in due nervous stimulus. There is no *standard* of idiotcy; but generally, perception is superficial, thought vacant, fancy frivolous, and bearing eccentric. The grades are many; and no one who has not seen a group of them can imagine the many differences they exhibit. Some are vociferous, some silent; there are the moping, the motionless, the restless, and the grinning; some are mild, affectionate, and obedient, others are wildly influenced by dreadful passions; others are dumb, lame, and epileptic. Not one will be found to meet the necessities of nature normally. Their touch, feeling, apprehension, bearing, perception, are all more or less faulty. Many are blasted in the bud, and can only be kept from growing worse, and made comfortable; but great numbers are capable of unexpected improvement, and actually are found to desire it. Till trial has been made no one can pronounce that idiots are thus capable of being taught. The true principles are greatly founded on the observation of psychological symptoms. If an idiot can distinguish his food, he has some perception; if he can choose between two objects offered to him, he has some comparison and judgment; if he yields to gentle persuasion or serenity of manner, he has some understanding; if he has any tastes, however limited, there is something occupying the mind. In all these the trainer sees capacities for improvement. His principle is that idiots are not only endowed with animal instincts and propensities, but with the feeble germs of those better qualities which are superadded to our physical nature; and which could never occur in the best trained inferior animal, even if its perceptive faculties were more acute than theirs. It has been found necessary also to mark the *degrees* of idiotcy, and to include them in the threefold division of *the idiot proper*, *the fool*, *and the simpleton*, each of which requires a peculiar system of management. Dr. Guggenbühl received the first impulse to his benevolent efforts among cretins, by seeing one of the lowest grade kneel daily before the image of some saint. He inferred the presence of mind, though the aspect was mindless, and thus attained to his present success. Some idiots have powers up to the common standard; when these are discovered, they become the key of the mind. Distinctive specialities are perpetually observable. This principle is also established, that it does not follow that because a human being is unequal to one set of operations, he is so to all. The office of a teacher of the idiot differs from that of the dumb or blind, where one sense has to be substituted for another, inasmuch as here the senses and powers have themselves to be educated. These must be developed, and then applied to the common actions of life. Improve the senses, mind, and powers, and the corresponding results are activity, will, and intelligence. The task has been most arduous, but the successes have been great.

II.—As to the methods, the first question was, *how to begin?* The answer was, *with the body;* for an ordinary boy brought to his teacher, has already his body broken in to the service of his will. Not so the idiot. The plans must be regarded at present chiefly as tentative, because new ideas open daily. The teacher must try to quicken the bodily frame by sensorial exercises, and the mind by intellectual ones, blending with them the regimen that will induce better health. An idiot is brought to him: he finds that he does not even know that he has such things as limbs. He must be made sensible that he has them, and that he can use them if he tries. One person's time must at first be devoted to a single case. When he moves the idiot must be enticed to move in the same way, until he has imitated by degrees the common kinds of corporeal motions. If he can speak, he must be taught to name the various parts of the body. Where there is hope of amelioration, this achievement gives great delight to the pupil. When he has acquired this knowledge of his own frame, and minds orders, and not before, he may be put into some class of beginners, and the exercises may be gone through with others in combination; he may also be present at the different occasions on which the household assemble. An idiot has seldom any notion of dressing himself; he must be taught step by step to do this. When simpler movements are acquired, the pupil may commence gymnastics and drill. The apparatus is of various kinds, but the difficulties are of three kinds: where there is defective muscular power—where there is no effort of will—and where there is some physical defect in the structure of the limbs. Different methods are adopted for these cases, and the successes are wonderful. To train the eye of an idiot is extremely difficult. He sees nothing accurately. Figures cut out of wood are laid before him; the teacher takes up one, and the pupil is taught to take up a similar one, and to place it in a similar position. A finger is held up; the learner must hold up a corresponding one. Imitation is an effectual means of teaching; but the idiot, even if he has powers of personal imitation, makes grimaces. Till muscular repose is attained, nothing can be done; it often takes a long time to effect this. The methods of teaching the letters, to write, to read, and other things, were fully detailed by the lecturer, as well as the ways in which idiots were brought to exercise various handicrafts; but space forbids our detailing them, though they were most interesting and ingenious, as well as the description of speaking lessons, finger lessons and other modes of training. Music is generally learnt with comparative facility; and there is constantly found in idiots a readiness in comprehending—and it is an instance of providential compensation—the simple truths of the Scriptures. If these fail, all agree there is little hope of advancement. They must never be kept too long at any one thing, but must be constantly refreshed by out-door exercises and amusements.

III. In describing the results, Mr. Sidney observed that they were those that he had himself witnessed in Park-house, Highgate, and Essex-hall, Colchester. In the latter asylum, out of eighty-one boys, now in a different condition, twenty-nine had never uttered an intelligible sound, and twenty-three were scarcely intelligible. Forty were filthily degraded, sixty-four were disgusting at their meals, and seventy-two might be said to be nearly helpless in everything. Only ten would willingly engage in any exercise or pastime. Out of a hundred and fourteen boys about sixteen are kept apart still, because subject to fits, and all that can be done is to render them as happy as may be. Yet of the remaining number, there may be seen any day sixty or seventy reading more or less, about thirty writing in copy-books, and some admirably; more than thirty write on slates, while sixteen or seventeen draw with much skill. At least fifty receive gallery and collective lessons, and as many are practised daily in the speaking classes. Nine or ten actually write from dictation. The singing classes of boys and girls make great progress, and a little regiment of boys is drilled daily. The same kind of improvement prevails also at Park-house, Highgate. More than sixty perform their own toilette neatly, and a large number attend the family prayers, and some manifest much gratifying devotion. Many go to church every Sunday, and not a few follow the service, and give a fair account of the sermon. The same happy account might be rendered of the poor idiot girls. There is a visibly improving tone in the pupils, and there are symptoms of a pervading influence inducing them to struggle with their infirmities that they may realise their own progress. The daily dinner, both of boys and

girls, in separate rooms, is a most decorous spectacle in each establishment; and so properly do they behave, and so well do they say grace both before and after the meal, that it is scarcely possible to conceive the assembly to consist of once apparently hopeless and degraded idiots. The dinner over, after a due interval, the various occupations are cheerfully resumed. The gardeners, tailors, mat-makers, rope-makers, shoe-makers all go pleasantly to work, and take a pride in their respective handicrafts, manifesting great delight at being asked to show their work to any visitor. The girls proceed to domestic employment, or to knitting, sewing, or fancy work, and various classes are formed of both sexes separately for writing, reading, geography, scripture exercises, and other profitable instructions. Those who examine them are always astonished, especially at the amount of Scriptural knowledge and mental arithmetic. Mr. Sidney further proceeded to illustrate his subject by a series of individual cases, showing the contrast of their past to their present state. Several of these poor creatures were so altered by the system pursued, that their own parents failed to recognize them when they first saw them on visiting the asylum. They are startled when they at last realize the happy fact that their once hopeless offspring are rescued from the slough of brutishness, and are made tidy, decent, industrious, and happy; and when to this change is added a knowledge of their Saviour, religious impression, and the hope of future felicity, the triumph of the devoted teacher is complete. Nor will the advancement made in teaching the poor idiot be without practical use in educating others. It will throw light on bodily training as a valuable agent in eliciting mental powers, though too frequently regarded merely as promotive of muscular strength and manual dexterity. Corporeal exercises in children need not be only idle amusement and vain pastime; they may be made of more service, both for the intellect and the organism, than ill-considered tasks and injudicious lessons. Proper calls on volition and attention in bodily exertions give tone and vigour to the system, not only increasing the power of the members, but inducing sound sleep, which ministers to the improvement of mind, helping the power of continuous attention which requires mental effort, and cannot be completely given till the mind itself improves. This country, ever ready to encourage what is shown to be for the welfare of the human race, will soon see the training of the idiot carried out in a large model erection at Redhill, near Reigate, the foundation-stone of which was laid June 16, 1853, by the enlightened and illustrious President of the Society of Arts, his Royal Highness Prince Albert. The knowledge of the existence of thousands of the brethren of the human family shut out from the world, by this appalling malady will awaken a larger sympathy than now exists. The proof that they are capable of being taught as described will arouse the generous spirit of the nation, and they will be rescued from the chain at home, from confinement with the insane, and taught the profitable lessons for this life, and their future destiny, now given to the favoured few in our idiot asylum. A wise Creator has not permitted the existence of human beings with veiled powers without design for them and us. To withdraw this veil may be part of our probation, and the success of the attempt is a fine proof of the practical genius of Christianity, the lessons of which strengthen the appeal to our hearts that we may help those thus afflicted, shorn of the wings of intellect, crippled in powers, and lagging behind in the race of progress, to the best place we can give them in the present life, and the high consolations of the hopes of that which is to come.

Friday, August 4th, at 8, p.m.

The Secretary regrets that Professor Tennant has been unable to write an abstract of his lecture on "Mineralogy and its application to Geology and the Arts" for this weeks' Journal, but trusts to his being able to do so for the next number.

Saturday, August 5th, at 5 p.m.

On the Principles and Teaching of Gymnastics; Practically Illustrated. By Henry de Laspee.

The lecturer, in introducing the subject, stated that his object was to banish from schools the system of gymnastics hitherto adopted, and to endeavour to get introduced the Pestalozzian system. The object was to develope the bodily faculties, and render them subservient to the will. This system differed most materially from the systems hitherto adopted, the tendency of which had proved to be that of strengthening and developing either one or more of the bodily powers at the sacrifice, injury, or the neglect of the others. Gymnastics were in former ages introduced into schools, as a means of strengthening the body, without any reference whatever to benefiting or strengthening the mind. The Greeks and Romans cultivated them to a very large extent, and it was very natural they should have done so, for, being a warlike people, physical power was to them of great moment. Since, however, the discovery of gunpowder, and the change it had brought about in warfare, gymnastics had fallen into less repute. It was considered, that the teaching of gymnastics, by exercising the limbs through the medium of a variety of instruments, particularly the use of warlike weapons, had a tendency to make men contentious rather than good subjects; and in Germany the government had frequently thought it necessary to interdict the teaching. The Pestalozzian system was free from all the evils which characterised the others. As a branch of education its merits had been highly approved by the best educational authorities in Switzerland and Germany, its leading feature being, as already stated, the development of the bodily powers in subserviency to the will.

In illustration of his system, the lecturer got sixteen children, eight boys and eight girls, all of them perfectly unacquainted with the system, whom he made go through some of the elementary training connected therewith. The great aim and object of the system is to call into operation all the bodily powers, and not a certain portion of them, and this is done by the aid of no artificial means, or the use of weapons, but simply by calling into action those powers themselves. The lecturer held that the system was admirably adapted for the improvement of the physical powers, and if these be in good and strong working order, a vigour and elasticity will be given to the intellectual powers. Besides, had we such a system in full and efficient operation in our schools, we should not see so many crooked backs and otherwise disfigured forms, especially among the female portion of the population, walking along our streets as we now do. As an instance of the want of such training, M. de Laspée stated, that in some schools which he had visited in London, out of one hundred young ladies he could not find five who could put their arms in what he called his position number two, in other words, right out on a level with the top of the shoulder. Few of them were straight in the back, and but few could put their knees together.

Saturday, August 5th, at 8, p.m.

On Mathematical Geography, and Easy Methods of Teaching it. By Hugo Reid.

Mr. Reid stated that this was a branch of geography generally rather neglected, yet capable of being rendered very interesting, and useful for the knowledge conveyed, as well as for the mental training implied in its study, and as an introduction to general astronomy. It was neglected because it was thought dry and difficult; because it was imagined that a globe was necessary, whereas much might be done by the common map of the world in hemispheres; and because it was thought more properly to belong to astronomy. Although, no doubt, it might fairly be included in astronomy, still it did not the less belong to geography. The main object of geography is to develop the characteristics of the different parts of the earth's

surface; and as there are great and well-defined differences in different parts, arising from astronomical causes, geography must be viewed as incomplete that does not give these as well as the other characters of the various regions of the earth's surface. Mathemathical geography should be begun after the child had become acquainted with the nature of a map, and the general geographical features of its own country. The first lesson should be to teach how to find north and south by the pole star and sun at noon, and thence the other points of the compass, so that it might be known what they mean, and how to come at them in nature, as well as on a map. This was not attended to, either in schools or in school-books, and an instance was adduced in which, instead of laying down the meaning of north and south, and deducing east and west, from these, east and west were defined as the points of sunset and sunrise, and north and south were determined from the shifting east and west thus obtained! The succeeding lessons should show that the world is round, the nature of rotation, of the axis, poles, equator, latitude, longitude, the tropics and polar circles, the zones, the leading causes of differences in climate, and the divisions of the earth's surface as to the sun's verticality, and the condition of the place as to day and night. It was shown that few definitions were necessary, and that the matters to be explained might easily be made intelligible to very young learners. After defining the position of the equator (easily deduced from rotation, axis, and poles), the teacher should tell what is interesting about it; that its length is 24,897 miles; that day and night are always equal there, the sun rising at six and setting at six; that the twilight is very short, so that it is dark almost immediately after the sun has set; that the temperature there is nearly the same at all seasons; that that temperature is very high, 81° or 82° Fahr. (which can be explained by reference to our hot summer days); that the animals and plants there differ very much from those in Europe; that the sun is overhead there on March 20 and on September 23 every year; that at the equator the sun is never very far from being over-head at noon at any time of the year; that the pole star is in the horizon; the Great Bear near the horizon, or below it and out of view; that the whole of the stars of the heavens may be seen there in one night, one half just after sunset, the other half just after sunrise; and we should not forget the alarms of the old navigators about the *burning line*, nor the ceremonies and tricks that Father Neptune practises on those who are crossing it for the first time.

These—expatiated upon and illustrated, and particularly contrasted with our own condition in respect to the different points—will excite great interest, and lead to numerous useful colloquies between teacher and pupil, and what is of great importance, will suggest observation and thought on a variety of every-day occurrences that are neglected because we are familiar with them.

The equator should then be connected in the pupils' minds with ordinary and physical Geography, by pointing out, and making them point out, the leading places it passes through or near. In doing so, it is well to go from W. to E. as the world rotates, and to begin at some notable point, as where the equator crosses the *first meridian*, which might now be pointed out, particulars as to its nature being deferred. The course of the equator would thus include the following places: it meets the first meridian in the Atlantic Ocean, just S. of the Gulf of Guinea; enters Africa a little N. of Cape Lopez; crosses Africa; enters the Indian Ocean; passes a little S. of the Maldive Islands; through Sumatra; a little S. of the British settlement of Singapore; through Borneo and Celebes; a little N. of New Guinea; through the Pacific Ocean; through the Galapagos Islands; enters S. America in Equador; passes just N. of Quito; crosses new Granada and Brazil, and leaves that country and S. America and enters the Atlantic Ocean at the mouth of the river Amazon.

If the learners are often made to point out the course of the equator in this manner, or to watch others doing it and sometimes to describe it from memory—not seeing the map—we fix in their minds important facts as to the positions of these places as regards the equator and each other, and their relations to the earth's rotation, to the solar influence, and to the stars, while their interest is excited by the striking contrast thus presented between the phenomena of the equator and those of our own latitude.

The tropics should be defined as the furthest north or south parallels at which the sun is vertical. This includes an account of the torrid zone as the only region of the earth where the sun is ever vertical, and the division of the earth's surface accordingly, which should be shown by a figure. It leads to a comparison with our own condition as to the sun's elevation in winter and summer, in the morning, noon, and evening; and to the general fact that the place is warmer the nearer the zenith the sun reaches; whence arises the high temperature which prevails in the torrid zone. The times at which the sun is vertical at Cancer and Capricorn; the states of the northern and southern hemispheres at these times, and the leading places through which the tropics pass, should be pointed out. This at once imparts knowledge of interest and importance, and fixes the position of the tropics in the mind by the leading places with which it associates them. In teaching longitude, care should be taken not to confound a *meridian* with a *meridian circle*, as is done in most school-books, and longitude should be at once connected with time by the mention of the fact that all on the same meridian have the same time, &c. The notable places through which the first and opposite meridians pass should be pointed out. The teacher, before attempting to explain the polar circles and day and night, should make his pupils clearly understand the nature of the terminator (the boundary line between night and day), and its position (always 90° from where the sun is vertical.) He can then explain the polar circles as the parallels at the greatest distances of the terminator from the poles; and he can explain night and day by the manner in which each parallel (the line in which each moves by rotation) lies to the terminator. Without the explanation and use of this term it is impossible to explain differences of day and night at different places, and at the same place at different times. The earth's surface should again be divided according to the character of day and night:—1. *Regions of equal day and night*—Poles and equator, at each of which it is equal during the year (6 months each and 12 hours each); and *regions of unequal day and night*, the other parts of the earth's surface. 2. *Region of both day and night during each rotation*, that between the two polar circles. *Regions of occasional day or night for several rotations*, those within the polar circles. Also, the attention of the pupils in every school should be invariably called to the periods of the equinoxes and solstices. Thus, much interesting matter might be taught in common schools, with occasional short lessons and only the map of the world.

A short discussion then took place, in which the Rev. Mr. Procter, Mr. Shields, and other gentlemen took part, agreeing generally with the views of the lecturer, that the subject was worthy of much more attention than it usually received in any description of schools.

MONDAY, AUGUST 7th, AT 5 p.m.

ON THE TEACHING OF COMMON THINGS, AND OF SCHOOL FEES. BY THE VERY REVEREND THE DEAN OF HEREFORD.

After a few prefatory remarks on this kind of teaching, the lecturer explained what he would wish to be understood by teaching common things—things bearing on personal health and domestic comfort—on a knowledge of the principles on which the ordinary occupations of life are conducted—on the value of industry and forethought in all household matters, and then entered into an explanation of modes of illustrating what is taught

in our elementary schools, by its application to practical life, and with reference to the occupations carried on in the locality of the school.

There were many interesting points in teaching geography touched upon and explained; also the great necessity of getting clear conceptions of what is meant by standards of measure—whether of space—of time—or of capacity—in teaching arithmetic, was dwelt upon. The Dean then outlined what might be considered a series of lessons on common things and the best modes of teaching them, adding a few observations on the subject of school fees.

The CHAIRMAN (Mr. Harry Chester) would relate an anecdote of what occurred a few days back, when he and the Very Reverend the Dean of Hereford were at Salisbury. They had been out walking in the vicinity, and accidentally met a group of school-children. This, the chairman thought, presented a favourable opportunity for an examination by the Dean, and accordingly the latter inquired first, if any of the children knew the names and direction of the places in their own locality, to which a negative reply was given; but when they were asked if they knew where China was, they were quite informed on that point. The Dean then asked one of the children if she knew which was the north, the south, the east, and the west: she immediately, without the slightest hesitation, pointing straight before, said, that is the north, that is the south, pointing behind; that on my right the east, and on my left the west. The child was then moved in exactly the opposite direction, when she went through precisely the same process; and again when placed in another position, thus proving that she knew nothing absolutely of these things, but had been taught by a map laid out before her. The chairman also stated that the Council of the Society of Arts was fully sensible of the importance of having a permanent Educational Museum, and had made a communication to the government on the subject. It would depend on the public whether it should be established. It was a question of funds. The expenses of the present Exhibition were very serious, and were not nearly provided for by the subscriptions received. Mr. Chester also said that he entirely concurred in the opinions expressed by the dean respecting the payment of school fees. If schools could not be made self-supporting they should be made as nearly so as possible. We ought not to pauperise the poor in respect to the education of their children.* He never knew a case in which raising the school fees within reasonable limits had not been attended with good results. In his own village the fees had been raised, and not a child had been withdrawn from the schools in consequence of the higher charge; on the contrary, it had been paid more punctually than the lower one, and the attendance of the children had improved. He concluded by presenting the thanks of the meeting to the Dean of Hereford for his interesting and useful paper, whereby he had added another to the numerous services which he had already rendered to the cause of public education.

Mr. SAMUEL SIDNEY said, that teaching "common things" in the manner recommended by the Dean of Hereford, would do much towards overcoming certain formidable prejudices which at present discouraged education in rural districts. There were three difficulties in the way of educating the children of agricultural labourers—the disinclination of the children to learn—the indifference of the parents to their children being taught—and the more than indifference, in some instances the positive dislike, with which the employers of labour looked upon school education. The disinclination of children to learn would be in a great degree overcome by the proper use of the aids for teaching exhibited in the Great Hall. The indifference of parents, and the dislike of employers, would be dissipated by introducing into schools familiar lessons on those "common things" that were likely to be of use to them in their future pursuits. At present it was common to hear, both from parents and employers, that Jack or Sam, who had been to the parson's school, was no more use in the field than Dick or Harry, who had had no schooling; and there was some truth in the objection. He had frequently found peasant boys well taught in the peculiarities of the elephant and the camel, and quite ignorant in the peculiarities which made the horse fit for quick draught, and the ox valuable for the butcher. They were taught much about the animals of tropical countries, but of the best breeds of cattle in this country they knew very little. It was the same with respect to implements. A school teacher could not do better than make a plough the subject of his lesson, explaining the history of the implement, showing how and why the changes were made which substituted iron for wood, cast-iron for wrought iron in the share, and steel for iron in the coulter, and so on with other implements of acknowledged utility. The spade and fork might be made subjects of lessons, in which the pupils would learn how much could be saved in a day's work by having the handle and staff of length suitable to the worker. It was the want of such instruction that made the spread of the use of the improved implements so slow. On a visit to the show of the Royal Agricultural Society at Lincoln he had seen two thousand implements; some of the best, invented sixty years ago, had but recently been transplanted from the district where they were first used. This was owing to the ignorance of the simplest principles of mechanics which prevailed among farmers as well as labourers. This ignorance had a close connection with the question of school-fees, referred to by the Dean of Hereford in the last part of his paper. The farmers of the present day felt the absolute necessity of giving their sons such an education as would enable them to apply the scientific discoveries to practical farming. Farmers could not afford to send their sons far away to agricultural colleges. They wanted them at home at fifteen or sixteen. But by raising the character of parish schools, and teaching there the science of common things, the fees paid by farmers' sons would defray the expenses of masters of superior acquirements. There would, no doubt, be a prejudice against two ranks of society being taught in the same school, but the urgent need felt by all intelligent farmers, of mechanical and chemical knowledge, would conquer the prejudice of class.

Mr. HAY, master of the Kennington Oval Schools, said he conceived the true education of the people to consist not only in teaching "common things," but also in preparing immortal beings for another state; and thinking that the Society of Arts had this end in view, he was glad that steps had been taken to give an impetus to education; and therefore, at no little cost of time and money, he had done all in his power to contribute to the Exhibition; he had regretted, with the Dean of Hereford, that it had not received that encouragement from teachers he supposed it merited. [Mr. Harry Chester, the Chairman, here interposed, and reminded Mr. Hay that he must confine his remarks to "School Fees and Common Things." Mr. Hay then said he would convey his sentiments of regret to the Council by letter.] His experience confirmed what the Dean of Hereford had stated relative to *school fees*. Some 14 years ago he took charge of a school which would, in these days, be denominated a *Ragged School*; but by raising the school fee, he soon found the parents had set a higher value on education than hitherto, and the school soon wore a different aspect. When he came to Kennington, (1841), the children were paying 1d. each, and it was often with very ill-grace. The parents frequently became very rude and troublesome, especially when a child was sent home for having a torn coat or dirty neck; but upon the introduction of new apparatus and doubling the school fee, a great change was effected; the education was valued, and the tone of the school was much improved. He had formed an *extra class*, which paid a higher fee; this had been the means of attaching to the school a few respectable lads, who could stay longer than the other children; this, besides improving his own income, added to the income of the school and brought a

few of the better class of boys in contact with the lower, which had a most wholesome influence on the whole school. He was convinced that it was a great error to make education too cheap, and therefore he strongly urged the adoption of moderate school fees. He regretted that apparatus was so difficult to be obtained, first on account of its price, and secondly the general want of funds.

The Rev. Mr. PROCTER, of St. Stephen's, Devonport, wished to ask the Very Rev. the Dean of Hereford a question touching the subject of school fees, and to be allowed to invite masters in charge of Birkbeck Schools, some of whom he saw in the room, to give the meeting the benefit of their experience also in this important matter. The Birkbeck Schools are chiefly attended by the children of skilled labourers, who, from some cause or other, are willing to pay as much as sixpence a week for instruction; and, moreover, to purchase their own books, slates, &c. It is intended to increase this payment for tuition in some of these Birkbeck Schools. Mr. Procter wished also to ask for instances in which the small tradesmen in towns had been found willing to send their children to the same school with the boys and girls of their journeyman and of the day labourers of their neighbourhood. He referred to tradesmen whose social position in towns is about equivalent to that of small farmers in the agricultural districts—to wit, of King's Somborne and West Acton—the schools to which the Dean of Hereford had made special mention. He was anxious to obtain this information for the encouragement of those persons who are engaged in the attempt to bring National Schools into that condition in which they shall be almost, if not altogether, self-supporting; the assistance of the Committee of Council of course being taken into consideration. Speaking of his own experience, Mr. Procter said that he had been careful to render his own schools as efficient as possible, both in regard to his staff of teachers (himself supplying their deficiences), and in regard to the quantity and quality of his apparatus. The master of the boy's department of his school held one of the highest certificates which had yet been obtained, and was skilful in imparting his knowledge to children. The mistresses, although trained in his own schools, were expected to be more than usually competent. It was furnished with all the most useful apparatus—illustrative and otherwise—which is to be found at the depositories of the National Society, the British and Foreign, or the Home and Colonial School Society. The teachers were at great pains to teach common things in a commonsense way. The school contained about 350 children, out of a population of about 3000 persons. A few of these children paid 7d. a-week, some 5d., the majority of the boys and girls 3d., some 2½d., some, chiefly infants, 2d., a few 1½d., several 1d., or even a ½d., and some were free scholars. His custom is to require every person to pay a fair price, in proportion to their means and circumstances. The parents apply to himself, and he gives them, at his discretion, a note to the teacher, saying what sum is to be paid by those who ask for any abatement of the usual fee. The door of the school is never closed against any child because its parents are not in a position to pay the school fee. An order for total remission of payments for a fortnight or month ,or even for a longer period, is sometimes given, as during occasional domestic affliction or temporary need, and even to children who ordinarily pay 3d. a week, to prevent what would otherwise be an unavoidable break in their school education, and to rescue them from the mischievous education they would in the meanwhile, almost of necessity, receive in the streets. The boys of their schools, when brought into competition by examination with boys of other schools, which from local circumstances occurs annually, generally take the lead. The small tradesmen feel and admit that the children in this school receive a much better education than they can procure elsewhere for their own boys and girls; but nevertheless, they do not avail themselves of its advantages, and plainly say that they cannot do so—that were they to do so both themselves and their children would lose cast. A few of them tried the experiment, and say they found it would not do. The speaker observed in conclusion that he found mechanics generally willing to pay as much as 3d. a week for each of their children, but there was considerable difficulty in prevailing on them to purchase books even for home use. He would be much obliged if the Dean of Hereford could direct attention to any school in a large town in England, which was attended both by children of shopkeepers, or small employers of labour, and of mechanics and labourers, where the son of the shopkeeper and his errand boy or apprentice each received his education, or to any school in a large town which was self-supporting. In his own experience, the speaker found that the better the education he gave the more it cost him per child, but the teachers of Birkbeck Schools might be able to point to different results.

Mr. PEARSALL said, as school fees and support had been thus brought before them in the various forms of partial, voluntary, or self-supporting, he might ask them to make some enquiries as to the sums that were paid by men, having weekly earnings and limited salaries, for the education of their children. In towns which he was prepared to name, it was not a mere question of pence, or 6d., or 1s. a week, if the education was of the right kind; much more was paid—but the education must be of the right kind, and be respected, for the father to continue to give such sums for one child. With the young all experimental illustrations and facts and realities of nature were impressive when brought before them with the aid of the specimens themselves, and the use of the balance and simple tests. Boys had said, "we do not care for the explanations, only show us the experiments; we have books full of explanations, but we *never see* those *important* experiments and substances, as they are called." As to the opinion expressed by some, of the sentiments of employers preferring ignorant to intelligent men, he would leave that alone; there were associations now of all kinds, and they could choose those that conduced to their interest to support; but this he could say, that it would not be in the power of any capitalist's enemy to cause more anxiety and peril than occur when the capitalist or employer has to introduce a new invention, and has only to depend upon ignorant and unwilling men—both having scorned all arts and habits of learning.

MONDAY, AUGUST 7, at 8 p.m.

ON VILLAGE READING ROOMS AND LIBRARIES. BY THE HON. AND REV. S. BEST.

In directing our attention to the subject before us, the important question is, what means are there of educating the agricultural labourer—not the boy, but the man? The shrewdness of the northern intellect is the result of the education the man undergoes. The southern is not inferior in intellect, but the crassness that is indicated is the result of neglected education. This comparison is not made with the view of disparagement, but of pointing out the peculiar difficulties and disadvantages under which the agricultural portion of the community labour. There is a great call for agricultural improvement, and for improved machinery, and great efforts are made by individuals, but little or nothing has been done for the improvement of the artificer by whom the improvements are to be carried out. The drill and horsehoe, sulphates and nitrates, are doing wonders, but what has been done for the farm labourer who is to use and apply them? It is a practical and not a charitable question—how is skilled work to be expected from unskilled hands? It is idle to rate the poor fellows for ignorance, for want of perception, for want of intelligence or skill, if no effort has been made to secure them. The farmers of England must possess themselves of the practical truth that skilful operations require skilful operators, and that it is impossible to improve if we have not hands and intellects adapted to the carrying out of our improvements.

The school has been improved; the evening school may carry on the scholar who is too early taken out of school, but there is still a large gap in practical education to be filled up. Our object will be to rouse the intellectual character of the labourer, that he may be enabled to understand the skilful use of the machine or of the chemical process by which the improvements in agriculture are to be carried out. The Institute has done this in the towns. It may in some respects have failed, but it has kept classes together, and educated many of its members to work their way in life. It is to be hoped that, under the judicious management of the Society of Arts and its proposed examinations, far more will yet be done. What has been done for the towns by the Institutes may be done for the villages and rural populations by libraries and reading rooms. It cannot be done on the same self-supporting scale, but may be done at less expense. The state of the cottages are ill adapted to intellectual pursuits. The public-house is often a refuge from the inconveniences to which the state of the cottage subjects the labourer. He finds there what is found by other classes in the club and literary society; and that which is begun from a desire of social intercourse and conversation, or to read the newspaper, with which, wise in their generation, the publicans supply them, ends in habits of drinking and recklessness. A comfortable, well-warmed, well-lighted room, where the papers or books of the library may be read, where tea and coffee may be had, and where chess and draughts enable them to pass a pleasant and sociable evening, present many of the requirements which lead to the public-house. In most villages the schoolroom, or a class-room, or, where these fail, a cottage room, may be had, either gratis or at very little expense. Fuel and lights must be a certain expense, but it is but for two or three hours of an evening; and books and papers must of course be provided for. The latter may be taken in with others, for it is only after the hours of labour that they are wanted for the reading-room; and there are few parishes in which one or more daily papers is not taken in by the squire, the clergyman, or some resident gentleman, and would be freely given for the evening. Examples of rural parishes, in union with the Hants and Wilts Educational Society, of their expenses and receipts were given, showing how successful in many instances reading-rooms had been in that district. A source of income was pointed out also in practical lectures, which, gratuitously given to the members, harmonized with the objects of the Association, and assisted its funds; and a plan of dividing the country into districts for mutual assistance in future, was spoken of as having worked well and tended largely to the success of the movement, the object being to raise the intellectual standard of the adult labourer. What means can be better than practical lectures on common things. They are in themselves unexceptionable, and although not equal in specified cases to a system of classified instruction, yet all that, under existing circumstances, we can hope to do. The importance of the reading-rooms, as bringing the classes together—the farmer for news—the labourer for recreation, was dwelt upon, and the mutual and beneficial operation on one another pointed out. The means of furnishing the library, with the aid of the Society of Arts, in cheapening purchases, and of different societies, in providing books of a religious, literary, and scientific character, enables rural localities to dispose of their subscriptions to the best advantage; and the library, once established, grows by the increasing desire of the members for information. The success which has attended every effort to establish a reading-room ought to encourage us to persevere in providing for a large, most important, and much neglected class, who, while we seek for objects of our charitable efforts from one end of the world to the other, is at our doors.

The Dean of HEREFORD expressed his concurrence in the views laid down by Mr. Best, and spoke of the shades of experience; in one case the villagers declined a reading-room, preferring to take the books home. The Rev. Lecturer then adverted to examples of villages in the south.

Viscount EBRINGTON spoke of the advantages that might be expected to follow plans judiciously laid down; and the results of his experience of several parishes on his own estates satisfied him of the advantage; he had found an intelligent person at one place, who said they were so short of books to read, that a parliamentary blue-book had been read several times over, and they were anxious to have a History of England. His lordship then alluded to the question of cottage economy.

The Dean of HEREFORD said, he had often been urged to join schemes for building, of a philanthropic character, but he had uniformly considered this as a business question to be most effectually dealt with by making it the interest of landlords to build, and tenants to inhabit, light and healthy dwellings.

A GENTLEMAN gave his experience of the good effect of delivering some few lectures. He mentioned an instance in Norfolk, where one lecture being given, the reading-room and library were formed forthwith, and for years they had gone on with lectures and a library.

Mr. CHESTER (who occupied the chair) said, before concluding the discussion, he would call upon one who had experience on these subjects, and had given way several times during the discussion.

Mr. PEARSALL said although he had thought and talked and worked upon this subject, and was even then prepared for supporting the plan to an extent they might consider a lecture, yet the whole bearings of the case had been placed before the meeting by the lecture and the discussion. He had elsewhere taken the opportunity to express a just feeling towards those who lived in villages and agricultural districts. He thought now he had merely to say that his experience had shown that many towns and villages had characteristics nearly as distinct as those that belonged to individuals themselves. It was no uncommon case to find in one village or locality the warmest zeal soon manifested, while in a similar and neighbouring place it might be found a useless task to urge this, or indeed any other, public matter upon them. In some places the willing few were ready to do all that was requisite; in others the many wanted only one of these excellent friends and all would go right. He said this alike to limit arguments arising out of partial cases, and also to prevent any being discouraged by one set of people. As to the scheme itself he would only add it should provide for a continuous supply of books, by exchange or otherwise, to cause habit to continue what novelty had begun. The concluding remarks of the hon and rev. gentleman he was delighted to hear expressed; there were many hearts and homes now tha felt that the realities and distresses of absence of the emigrant, the soldier, and the sailor, were deeply increased by those on one side being perhaps unable to write, and the other unable to read. He was also disposed to follow out the idea that out of war and confusion much good and value to our Institutions might arise. They had heard of the anxious crowd at our village reading-rooms, to learn of the last intelligence from the seat of war; he would go further and say, if villages and remote hamlets received and supported libraries and reading-rooms, he would venture to think it might even add lustre to the character of England itself whenever and wherever it might become known; for while engaged in a war of which no man could see the issue, one nation using its power and resources to interfere with other nations, England, in the hour of conflict and of war, sought still to establish the literature of peace among the hard-workers and hard-thinkers of her villages and remote valleys.

Mr. CHESTER said, as their time was now exhausted, he would follow the practice of the Society of Arts, by giving the thanks of the meeting to the Hon. and Rev. S. Best for the paper he had read.

TUESDAY, AUGUST 8th, at 8 p.m.

ON TEACHING CRYSTALLOGRAPHY. BY THE REV. WALTER MITCHELL, M.A.

The lecturer commenced by stating that few geometrical forms had been greater favourites with the ancient geometers, than those regular solids known by the name of the Platonic bodies. It had been stated that Plato and his followers had affirmed that the greatest secrets of nature were contained in them. So far as we are aware of, they were unacquainted with the fact that three out of the five Platonic solids are found in nature, formed by the action of the molecular forces of matter with a precision and accuracy defying the imitation of art. After the prophetic vision of the scientific value of these forms had slumbered for many ages, the genius of Haüy gave the first glimpses of their practical application to a revelation of some of the most recondite mysteries of nature. A natural crystal of chrome alum, in the form of a perfect octahedron, one of the Platonic bodies, whose edges were about an inch in length, was exhibited. The fact that fluor spar occurs frequently in perfect cubes was mentioned, and that this mineral possesses the property of cleaving or splitting readily in such directions as to enable us with great ease to cut out a perfect octahedron from the cube.

By means of models it was shown how a cube of fluor spar afforded a demonstration of the last proposition but one of Euclid's Elements—the 3rd proposition of the 15th Book—"How to inscribe an octahedron in a given cube." The cube of fluor spar would readily split in such directions as to present the form of an octahedron or a tetrahedron, and thus afford accurate models of three out of the five Platonic bodies, while it could not be broken so as to present clean smooth surfaces in any other directions. Many other bodies in nature, of which the diamond was one, possessed the same properties in this respect as fluor spar.

The ready way in which some minerals cleave was illustrated by breaking some portions of calcareous spar, the fragments invariably presenting the edges and inclinations of a geometrical solid known by the name of the obtuse rhomboid, the angles of which were always similar. White marble, reduced to the finest powder, presented under the microscope no rough fragments, but sharp and defined rhomboids.

The accidental discovery of the cleavage of calcareous spar by Haüy, enabled him to classify the most innumerable and exceedingly complex forms of crystalline minerals in a system remarkable for its simplicity, while it affords what might justly be considered a model of a classificatory science. This presents an instance that no one should despair because a subject had presented almost insuperable difficulties to the greatest minds. Linnæus, who carefully studied the external forms of crystals, although so successful in other domains of nature, failed to discover a key to unravel the complicated forms of the mineral kingdom. The same substance which revealed, by a happy accident, to Haüy, the property of cleavage, had been carefully investigated by Newton. In his "Optics" he mentions this property, and even gives the measurement of its angles, though he failed to make the application of the fact, which brings nearly the whole range of inorganic nature within the sphere of geometry.

To give an idea of the nature of Haüy's labours, it was shown that the "Comte de Bournon," in his treatise on carbonate of lime, had described between six and seven hundred crystals of the same substance, all differing from one another, some of the most complex presenting 40 or 50 different faces. All these were shown by measurement to possess the simplest geometrical relations to the rhomboid obtained by cleavage.

Mr. Mitchell then demonstrated, by a series of models of the cubical system of crystallography, the nature of these geometrical relations, and how bodies, at first sight apparently most dissimilar, possessed relations in common with one another. The property that all the simple bodies of the cubical system can be inscribed in the cube, and their relations to that body, as well as the process by which one body may be conceived to pass into the form of another, was shown in a variety of ways by a number of models.

A number of instances, showing the value of crystallography, not only as a means of mental discipline of the highest order, but also as of the greatest practical importance to the chemist, the mineralogist, the medical man, and the manufacturer, were then mentioned. The next question was, could this subject be taught so as to bring it within the range of our elementary schools. The lecturer maintained that it could; and practically demonstrated how, by a few sheets of cardboard and a few pieces of wire, amusement might not only be afforded to children, but they might easily be brought to apprehend truths which even a mature and practised intellect would have great difficulty in comprehending from drawings on a plane surface.

A few circles of wire were combined together in such a manner as to demonstrate some of the most complicated theorems of crystallography. The opportunity was taken of impressing on the educators of youth how easily they might thus for a few pence construct instrumental aids for education, which would make many of the most difficult problems of astronomy, geography, spherical trigonometry, and solid geometry, clearly understood.

Having acquired a knowledge of the simpler forms of bodies by pasteboard models and wire-work skeletons, it was shown how readily a knowledge of their complicated combinations might be acquired by coloured diagrams and models, care being taken that the planes of the same simple form should be represented of the same colour throughout the representations of all the combinations.

WEDNESDAY, AUGUST 9th.

Mr. Edwin Chadwick, C.B., who was to have delivered a lecture on "Points of the Sanatory Construction and Management of Schools," informed the Secretary on the afternoon of Tuesday, the 8th current, that he would be unable to do so, owing to ill-health, and to the circumstances of a closing Commission amidst an impending visitation of a severe epidemic.

THURSDAY, AUGUST 10th, at 3 p.m.

ON THE TRAINING SYSTEM OF EDUCATION, PARTICULARLY AS ADAPTED FOR LARGE TOWNS. BY WILLIAM KNIGHTON, M.A., M.R.A.S.

The lecturer began by stating that Mr. Stow was prevented by illness from explaining the system, to the establishment of which he has devoted his life and fortune for the last thirty years.

In superintending Sunday schools, between 1816 and 1821, the founder of the training system was first led to inquire into education, and particularly into the reasons why teaching in Sunday schools alone, when unaccompanied by other education, was so ineffective. He was led to believe, after much investigation of the subject, that the influences at work upon the child out of-doors were more lasting in their results because they were not simply *teaching*. The principle of imitation common amongst all mankind was to be partly charged with this result. Children like to resemble those with whom they associate, just as men do. This influence—"the sympathy of numbers"—is powerful for evil in lanes and alleys; why should it not be made powerful for good in schools. The proper means by which it is to be so made powerful for good in schools were by no means easy of discovery. Teaching alone will not do, there must be more than teaching. The word *training* was introduced into education by Mr. Stow, and the way in which it was received.

Mr. Knighton proceeded then to explain what was meant by training in opposition to teaching, and in doing this took a rapid survey of the faults and omissions of the

education usually given in schools at the period when Mr. Stow began his labours;—that education was directed chiefly, if not exclusively, to the *memory*, the other powers of the mind being neglected or ignored. *Training*, in contradistinction to *teaching*, would develop all the powers of the mind harmoniously,—the observing faculties, comparison, imagination, judgment, and the moral sentiments altogether,—not by simple admonitions, or by addressing the intellect only, but by outward appeals, appeals to the senses, by the visible, the external, the tangible; by imitation, suggestion, and all the various modes in which the sympathy of numbers can act upon children. To accomplish this a large proportion of oral instruction was introduced into the school routine, simultaneous methods developed, a playground attached to the school premises, and a gallery erected in it for greater convenience in giving simultaneous lessons. These simultaneous lessons form the great means presented by the training system for the *intellectual* development of the pupils, and that part of the system, too, to which perhaps the most objection has been made. This objection has probably been often made in consequence of a misapprehension that has prevailed, to wit, that the training system requires all subjects to be taught simultaneously. Nothing can be further from the truth. All the training system aims at is a judicious combination of individual and simultaneous instruction, nor does it give any particular method as that by which arithmetic, geography, and the other branches of elementary education may alone be efficiently taught.

In the giving of simultaneous lessons on the elements of science, and on common things, by means of questions and ellipses, Mr. Knighton showed by an example how all the powers of the mind might be brought successively into exercise, and how the analytical and synthetical habits of thought, the method of suggestion and illustration—"picturing out" in fact, as it is called—may be made available, to awaken and maintain the attention. In such oral lessons, whether scriptural or secular, the children should be prepared to give the lesson, the deduction, the grand final truth, towards which the rest of the exercise is but the path that leads the children.

It was explained that the training system by no means demands an indiscriminate aggregation of various ages and stages of progress. It requires that the children should be as nearly as possible of the same age, and as nearly as possible at the same stage of improvement—the more nearly in both cases the better, because "the sympathy of numbers" is more powerful and influential when such is the case. Nor does the training system propose simultaneous instruction as a cheap substitute for individual instruction—it requires a judicious combination of both as its fundamental principle.

The point of most importance, however, in the system, and that which best fits it for large towns, is its endeavour to find a suitable antidote to the evil training of the streets and lanes—its method of moral training. These may be regarded as the characteristic features of the system. In the play-grounds, argued Mr. Knighton, children will exhibit themselves such as they really are. Their good or evil dispositions, their excellencies or their defects will show themselves when the discipline of the school-room has been shaken off, and the individual existence of each child is no longer merged in the aggregate of the school. By mingling with them in their hours of play, the teacher becomes acquainted with the peculiar faults into which each is most liable to fall; he checks impropriety and the exhibition of violent temper. The restraint is at first felt to be irksome by the vicious child, but is gradually succumbed to, and what was done with a violent effort at first, is soon accomplished without inconvenience. New habits are formed, old ones are discarded; the vicious child recently introduced, is taken as it were from one atmosphere, an atmosphere of pestilent vice, and now breathes another, an atmosphere of morality. The same sympathy that would make that child morally vile in its native lane, makes it morally excellent in the well conducted school. But the influence of the playground does not end here. The teacher, noting what takes place there, may refer to it in his Bible lessons, bringing texts to bear upon particular faults or vices observed, and showing offenders how they have transgressed the law of God in their uncharitable conduct or in their displays of selfishness. The playground may be made also a field for the exercise of self-denial, by the cultivation of fruit and flowers round its borders, which the children should be trained to care for and look after, but not to steal. If there be any class upon whom it is imperative to exercise self-denial, that class is the very poor in large towns and their neighbourhood; hence the necessity of beginning early with them.

The way in which schools might be built in towns where land was too dear to admit of the purchase of a playground was then explained; built, so that the school itself should combine in one building the "covered" and the "uncovered school-room," the ordinary school and the indispensable playground.

The advantages likely to result from training the male and female children of the very poor together in infant and juvenile schools were then pointed out, the arguments being founded on the fact that such classes receive little or no domestic training at home, and therefore should be trained early for a state of society in which both sexes are brought together into crowded houses and rooms for so great a portion of their lives.

If education is to be complete, *religious and moral, intellectual and physical* training must be combined in order to render it so. The training system aims at doing this. Its Bible lessons and playground supervision, its combination of simultaneous and individual instruction, its singing, its care to foster a beneficial sympathy of numbers are the means by which it would educate the whole child.

Mr. Knighton concluded with a few statistical facts showing the rapid extension of the system, and with a short account of the ordinary routine adopted in those schools which have taken their method and system from the Normal Seminary in Glasgow.

TRADE MUSEUM.

At a recent meeting of the Agricultural and Horticultural Society of India, the subject of the Trade Museum now forming in London under the joint sanction of the Society of Arts and Her Majesty's Commissioners for the Great Exhibition of 1851, was taken into consideration, and it was resolved to contribute duplicate specimens of all the animal productions and manufactures of India then in the Society's Museum which could be spared. The arrival of this collection may now shortly be expected, and will form a most valuable addition to the East Indian portion of the Trade Museum, which, from the extensive series of samples of silk, wools, etc., presented by the Honourable East India Company, and those derived from private sources, already contains illustrations of many of the chief animal productions and manufactures of India.

PARIS UNIVERSAL EXHIBITION OF 1855.

In addition to the various Trade Committees of the Metropolis, Committees have been appointed in all the large manufacturing towns, so that it is fair to conclude that British industry will be well represented at the Paris Industrial Gathering. The following is a list of the towns in which Committees have been appointed:—Aberdeen, Arbroath, Belfast, Birmingham, Bradford, Coventry, Derby, Dublin, Dudley, Dundee, Dunfermline, Edinburgh, Glasgow, Greenock, Huddersfield, Hull, Leeds, Macclesfield, Manchester, Norwich, Nottingham, Paisley, Preston, Sheffield, Staffordshire Potteries, Stockport, Sunderland, Trowbridge, Walsall, and Wolverhampton. Applications have been received for 150,000 square feet

of space, from 1000 exhibitors. A summary of these has been forwarded to Paris, and the Commission are now proceeding with the allotment of the space to the different countries.

ON ARCHITECTURAL MATERIAL, STRUCTURE, AND ORNAMENTATION, AND THE WORKS OF MR. RUSKIN.

By W. Bridges Adams.

(*Continued from page* 633.)

In the use of carved stone for buildings, elaborate work requires a comparatively soft material, which is subject to rapid destruction by atmospheric influences, and the more rapidly the slenderer the work is. Certain portions of all buildings must be duplicates of each other, for whatever scope Mr. Ruskin may allow for variety, he would scarcely make the two sides of a pointed arch unlike. If, therefore, art can prepare terra cotta, or brick, or artificial stone to have as good a colour and with greater chemical durability, it would be better to mould the parts in artificial material, than thus to cut them in stone by the chisel; and far cheaper. And if cast-iron be a cheaper material, and further knowledge shall enable us to render it incapable of oxydation and of receiving any colour we like, it is better to use that than stone, for the tracery may be far more delicate. The structure can be prepared, and the carving put on in parts where under-cutting occurs, as would be done, were it practicable, in stone; for statues, carvings, flowers, and traceries being ornamentation, must be supposed to be applied on the surface even when they are carved from the solid. Mr. Ruskin will not contend that a building is more valuable merely by reason of its cost, or the greater amount of labour bestowed upon it. The lilies of the valley "toil not, neither do they spin," yet are they very beautiful; and moulded metal is just as original as carved stone, if the patterns be first prepared by the artist. If the patterns and the metal together cost less money than the stone and the carving, and the metal can be preserved from rust, it is clearly preferable, by reason of its greater strength and lightness.

Iron is coated with glass for various purposes. The time will probably come when this will be prepared more cheaply and more perfectly, and of any variety of colour. If this be accomplished, a more beautiful material can scarcely be conceived for opaque purposes. There is something incongruous in a vaulted stone roof being covered externally with a mask roof of timber and boards, and sheets of lead. The dome of St. Paul's with a steep cone of brickwork, secured at the bottom by an iron chain against expansion, and covered outside with a mask dome of timber and lead, is still more incongruous. The roof of Westminster Hall appears more natural or rather artistic, and there is no reason why the roof of Westminster Hall should not be executed in cast iron or wrought. Chesnut timber is beautiful and durable, but it is in limited quantity, and moreover, it is combustible. Durability against fire, durability against weather, are two essential qualities in building materials, and when we find that in many cases large public buildings in elaborate stone, begin to decay before they are finished, in our variable climate, it behoves us to try if in the resources of human art, we cannot find material more durable than in the resources of nature. In artificial siliceous stone, capable of being moulded to form as easily as bricks, we shall probably find a material as durable as glass or agate. It may be that we shall ultimately be enabled to prepare such material in large masses on the spot where it is used with less expense of carving than that of large blocks of stone, and with far less expense of workmanship. Agate, and jasper, and chalcedony, and cornelian, are far more beautiful and precious to the eye than sandstone or even granite, and those who remember the exquisite marbled glass shown by Mr. Swinbourne, of Newcastle, at the Great Exhibition, may understand that it is scarcely possible to imagine a more beautiful material, or one more appropriate for building and ornamental purposes.

In his strong love for Gothic architecture Mr. Ruskin overlooks his own well-stated objections to confining architecture to fixed orders, his love for the Gothic being apparently grounded on its never-ending capacity for change and ornament. He objects, and with much reason, to our modern system of structure for shop windows, and maintains that the Gothic form would be stronger and better. But in this he overlooks what all shopkeepers require as a first principle, the maximum of light and show-space Every available inch is put into glass. To this all other considerations—form, structure, safety, and everything else—is sacrificed. And it is a good and useful object, with which Gothic-fronted windows appear incompatible. It is a case of structure before ornament, and we must begin at the beginning, which has not been the case with shops.

Shops in London appear to be akin to the kind of clothing formerly prevalent in Ireland—applied to purposes for which they were not originally intended. They are mere expedients, akin to the ideas of the forest-born American wife, who sent her son twenty miles across the swamp to a neighbours, "to beg the loan of her next axe, in order to make her own hog a hencoop." Even thus, as hogs continue to dwell in hencoops, because they began with them accidentally, so dwellings unconnected with shops originally, have set the pattern for shop building, just as the Chinaman who found out roast pork by the accidental burning down of a house, continued to burn down houses whenever he required a fresh supply of that delicious eatable.

In the outskirts of the town a row of houses is built with gardens before and gardens behind. In process of time the houses find themselves in town, and are no longer desirable residences for people of any income. They abandon them, and people with livings to get take their place. The first process is, that a front garden is covered with a shop, shutting out the prospect of the neighbours on either hand. The front of the shop is all glass, to get as much light as possible. Another and another succeeds. After a time a house is built over the shop, and whether by building act, or want of perception, the house is built of heavy brick and mortar, as the original house was, and contrivances are resorted to for supporting the wall by masked supports of wood or iron posts, and the house gets to wear the appearance of a brick wall supported on a glass basement. So in streets of private houses changing into houses of business, the practice is to knock out the pier between the two lower windows, and carry the brick wall on a brest-summer of timber. Then, show space being still needed the side piers are knocked away, and two strong posts applied. Then a large fasure board is applied over the brest-summer. After a while that is carried higher, and the window is carried out over the area; and then it is made to mask a portion of the wall, showing a lofty shop outside and a very low one inside. And, strange to say, when the building is decrepid and pulled down the new one is built in imitation of the original expedient, like the patchwork on the Chinaman's new coat.

If we were really to begin at the beginning, for a street or town of shops, carefully considering the requirements we should first resolve to have nothing to do with the underground, but leave it altogether for sewers and drains making the lower range of the building on the surface serve for cellars, the ground itself between the buildings on either side being left for the railway street. At the requisite height should be a second surface, with lights and ventilation for the lower part, which second surface should be the road-street, for foot passengers and light vehicles free from mud and dirt, and at this level, some sixteen feet above the ground, should be the rows of shops, in a drier, lighter, and better atmosphere. The width of the streets should be governed by the height of the houses above the

shop-floor, and in all cases, in this northern climate, the height of the house should not exceed one-half the width of the street. This arrangement would permit the light to penetrate very far back into the shops. The whole front of the shops should be of glass, as at present, and there should be no brick wall above. The slender iron columns masked in glass, should be carried up to the total height of the building. The ornamental architecture should be of glass columns, and frames of coloured glass would be susceptible of the most beautiful ornamentation. The first attempt at the application of glass to window frames has been made in St. Paul's Church-yard, but the effect is not good; the columns are too slender, not of good form, and of the wrong colour. Grooving sheets of plate-glass into transparent columns has not a good effect. If some true artist will take this matter in hand, to produce a glass front for commercial purposes, taking full advantage of transparent and coloured glass, and with a machine lift on a simple plan, to save the labour of stairs, he will present an example how to convert a whole building into an efficient shop or showroom, that will be rapidly followed all over the metropolis. And if he be wise, he will confine the ground floor to rough uses, as neither light, nor dry, nor airy enough, for the purposes of elegance or health.

With regard to the party walls, they should be strong and heavy, as well as the back wall, in order to carry the flues and chimneys. The material of the party walls should be solid fireproof, brick or stone, and it appears that the Americans in New York have found out a valuable material for these in steatite, or soapstone, which itself furnishes the cement for its own service. In fires neither Roman cement, nor mortar cement are safe. Lime, heated, always returns to the state of quicklime. It is a desirable thing if, possible, to make an artificial steatite, and to this our chemists would do well to apply themselves. Chimneys should be cast-iron pipes, of square or oblong section, building in with the brickwork. Such pipes should always be cleansed like a cannon or gun-barrel, by drawing a wad through them.

The floors should be fireproof, and firm, and devoid of all elastic movement. There are few things so unpleasant as a vibrating building, and few things so mischievous or so likely to induce dilapidation. A thoroughly firm floor, fixed upon firm walls and upon iron columns in front, would do much to ensure stability both of walls and floor. An elastic wooden floor is always tending to thrust out the walls.

A distinctive feature in modern buildings, as compared with former ones, is the combination of the tensile with the compression principle. It is true that in wooden roofs the horizontal beams exhibited a tensile strain, but not in comparison with the enormous spans of our modern iron roofs; and in treating this principle with contempt, Mr. Ruskin is not wise. In the olden practice of building walls, everything depended on compression; material was piled on material by mere gravity, but, for certain purposes, it was needful to build bond timber into the walls. In process of time the wood rotted, and the wall "settled." The modern iron or iron hoop, which acts like packing strings, are bedded in the mortar and are chemically as durable as the wall itself. This is a most important feature in modern building. Again, in the brick heading to windows, they can now by means of iron ties, bedded in cement, become a single solid lintel, far stronger than a stone lintel. The arch principle remains in the straight beam or lintel, i.e., the compression exist in the upper portion, but the abutment is formed by the tie-rod in tension instead of being formed by a mass of compressed material.

The common mode of making fire-proof floors formerly was, by making a solid mass of tiles and mortar, equivalent to the size of the floor. But unless built with timber joists this was very dangerous, and even then the timber was apt to get dry-rot, in which case all came down together. To lighten such floors, in some cases they were built with hollow pottery; but this, too, was dangerous from the cracking of the pots. Such floors cannot be safe unless there be strong compression above to sustain the strain below.

The tension principle in floors was first brought into action by means of parallel cast-iron beams of sufficient number and strength to sustain the whole weight of the floor. Brick arches stretched from beam to beam, and the structure was sustained by tension-rods from one beam to the other. In this mode, the whole weight of the floor is sustained by the screw threads.

Another method is by laying the iron girders parallel from wall to wall, then putting in cross beams between them, resting on their flanges, then filling in with wood in small pieces, and enclosing the whole in a mass of concrete. This makes a strong, heavy, and solid floor, but it has no wrought ties, and if a cast girder breaks by means of a flaw it will have a tendency to break down the walls, as has sometimes occurred.

But it is not desirable to have floors solid, and the hollow spaces between the floor and the ceiling are the proper channels for warm air and ventilation. An iron framework, made of wrought iron below and cast iron above, and tied together in one firm body, and covered above and below with sawn slate, or similar material, in large slabs, will be the most perfect arrangement, and susceptible of great beauty of ornamentation for a ceiling, by its compartments. There is scarcely anything more unsightly than a ceiling of large extent with no apparent structure.

The defect in most structures of this kind has been the proceeding on the wooden-floor principle of making all depend on certain huge parallel beams running in one direction, which beams rest on two opposite walls, just as roof principals are formed. This defect consists in the roof or floor only bearing at intervals, each portion distant from another, so that a settlement of a wall disturbs the level in patches. If we imagine a floor to be formed of a network of wrought iron, with meshes from four to ten feet square, and pillars half the width of the mesh in length, set at every intersection of the cross line, and a rigid frame of timber or of cast iron placed upon the pillars, and the flexile net below bolted through the pillars to the rigid net above, we should then have a structure self-contained that would bear the strains equalised in every direction, and which would lie upon the walls with equal pressure all over, and without horizontal strain. If the meshes were carried on above and below with slabs of slate corresponding to the apertures, and properly jointed, we should have a floor with all the requisite conditions—safe, chemically durable, unapproachable by vermin, incombustible, and hollow, for the passage of our water pipes, gas pipes, and all the internal mechanism needed for health. If we cut out two or three meshes from a stretched net, we scarcely reduce the strength of the net; and so with the floor described, the failure of a mesh would not induce the fall of a floor, whereas in ordinary construction the breakage of a main beam frequently involves the ruin of the building. Floors on this net principle might be extended to 200 feet square and upwards without central supports.

In the structure of a roof or ceiling by Gothic arches, so much space is involved that it would be impracticable in small buildings of many stories. In England as much light as possible is required, and Gothic windows will not admit the same amount of light as square windows.

In the roofs of most of our dwellings we imitate the Gothic principle of cathedrals, an inner and an outer roof, and between that inner and outer roof we have a space which answers the purpose of an air chamber. It might be of pure air, but practically it is foul air. In this space, which we call a "cockloft," possibly from having been originally a roosting place for fowls, all the moving dust and soot, and foul air of the dwelling enters and nestles in darkness. All dry gaseous pestilences are there found, the aeriform substances thrown off for generating by the lungs

of the in-dwellers. Yet this space should answer two purposes. It should inclose air to keep the house warm in winter time, and it should have a current of wind passing through it to keep the house cool in summer. The roof, therefore, the inner roof, or ceiling, should be flat, and formed precisely like any other floor of the house, the joints between the slates being filled with strips of cork, precisely as wine bottles are stopped, for the process which has for so many centuries been found the best for keeping liquids in a bottle would assuredly be the best for keeping water out of a roof. A chief reason why we cannot maintain flat roofs of cement tight in our English towns is, that the constant tremor cracks the brittle material, in addition to the same process going on by expansion and extraction. If the covering be a rigid or porous material, and the joints be caulked by an elastic material, a tight flat roof will be the result, not requiring repair till the caulking becomes chemically destroyed, because it must be remembered that there is no weight of water to be resisted, but simply the gravitation of surface leakage.

The roof being thus formed below with proper drains and gutters we have only the external roof to consider. This may be made as thick as may be required, and there can be no question that the proper material for it, would be thick glass, whether a complete structure in itself or in combination with iron. In making the joints of glass the same principle of elastic caulking should be observed—the joints should be corked like a bottle. It is often remarked that it is an impossibility to keep skylights tight without constant repair. The reason is simply that the putty, formed of oil and chalk, so long as it is plastic yields to the expansion and contraction, but after a while it becomes brittle, and cracks, either from the glass or from the wood or metal sash.

The glass roof should in no case overhang as an eaves, nor should any roof do so in a city, on account of the danger of portions falling when getting loose, and also on account of the risk workmen are exposed to in repairing; and for this reason the law has imperatively and wisely prescribed the use of parapets in streets. Gables to the street might to a certain extent obviate this, but a gable without a barge board fasure is unsightly, when the wall runs up above the roof; and the barge board is essential, as well as ornamental, to keep the water from getting in when the roof overlays the wall; and barge boards are apt to get loose and fall down.

The glass roof should be arranged so as to confine the air or permit a current at pleasure, for the sake of warmth or coolness. And there is another purpose it might answer—that of a green-house. There is a tendency in all air which has passed from the lungs to ascend, if there be a proper upward-current, and this vitiated air is the proper food for plants. The dark "cockloft," therefore, should lose its name in the light "flower-loft;" and, with the appliances of coloured glass and blinds, as the smoke from the chimnies would not get access, it might be made a pleasant apartment, and instead of the roof being constantly neglected, and the gutters left to fill with ashes and snow, they would be constantly attended to. And with regard to snow, the facility of keeping up a constant supply of warm air beneath the glass would ensure its melting without trouble.

As in a well-arranged city it is to be supposed that water would be constantly overflowing above the level of the roofs it would be quite practicable to have fountains in the flower-loft constantly running, and keeping the gutters and drains clean.

(*To be continued.*)

The Literary and Scientific Institutions' Bill having been amended in the House of Lords, was remitted back to the House of Commons, through which it was passed on Wednesday last.

Home Correspondence.

METALLURGY AND DECIMAL COINAGE.

Sir,—Certain recommendations made to the Council of the Decimal Association, raise the following question :—

What metal or metals might be combined with silver, in the proportion of not more than 40 per cent. of fine silver to the mass, in order to produce an alloy suitable in all respects for coinage of low denominations, but not liable to harbour dirt, and feel greasy, as is the case where copper and silver only are employed, as witness the billon coins of Germany and Holland?

Can any of your readers either supply the information, or suggest how it may be obtained, addressing the Hon. Secretaries of the Decimal Association at the house of the Society of Arts.

J. A. F.

London, August 3rd, 1854.

PUBLIC HOLIDAYS.

Sir,—I much lamented my unavoidable absence from the recent Institutes Conference. Among the interesting subjects which were there discussed, I greatly wished to have suggested the question of public holidays, since broached by a correspondent of the *Times*. I have often made the many considerations mixed up with it the subject of conversation,—health, morals, the observance of the Sabbath, the price of labour, the uses of museums and places of public instruction and recreation; all these points and others would have found at our Conference informed men peculiarly fitted for their practical elucidation.

I speak particularly of holidays for the industrious working man; all who really labour in this country have too little relaxation—but he has none. His body and mind both suffer from the endless toil he undergoes, hence the Englishman's character as a grumbler. He toils, and, discontented, complains—he has no day of pleasure to look forward to and sweeten his labours. "Merrie England" has become a fiction to him. To improve the condition of the working man is one of the prominent objects of the present day; it leads us to promote public libraries, museums, exhibitions of art, gardens, &c. And then the question arises, What opportunities have the labouring classes to avail themselves of the advantages and pleasures which these institutions would afford. Let us avoid the vexed question of opening such places on the Sabbath. Let us set apart a few days in each year as national holidays, which all may conscientiously enjoy.

Those a step above the mechanic and labourer, paid by the day,—those who receive monthly or quarterly salaries, usually enjoy some short period of holiday, without abatement of pay—why should not all have the same happy privilege. Does any one suppose that three days' holiday out of three hundred would entail a loss to the employer; "a merry heart goes all the day," and would not be one hundred days, nor ten, in making up for one spent in healthful relaxation.

I can readily foresee many practical difficulties which will arise, but I do not think that any would be found insuperable. In the *Society of Arts Journal* the subject will meet the eyes of a large body of those most interested and best able to appreciate it, and may ripen for future discussion and action. Let the working man show that he is prepared to value and properly enjoy two or three days set apart in each year as holidays for all; let him petition this boon of the legislature, and means will be found to meet commercial and trade difficulties, and to grant so reasonable a request. The first day we should all wish to name would be our gracious Queen's birthday.

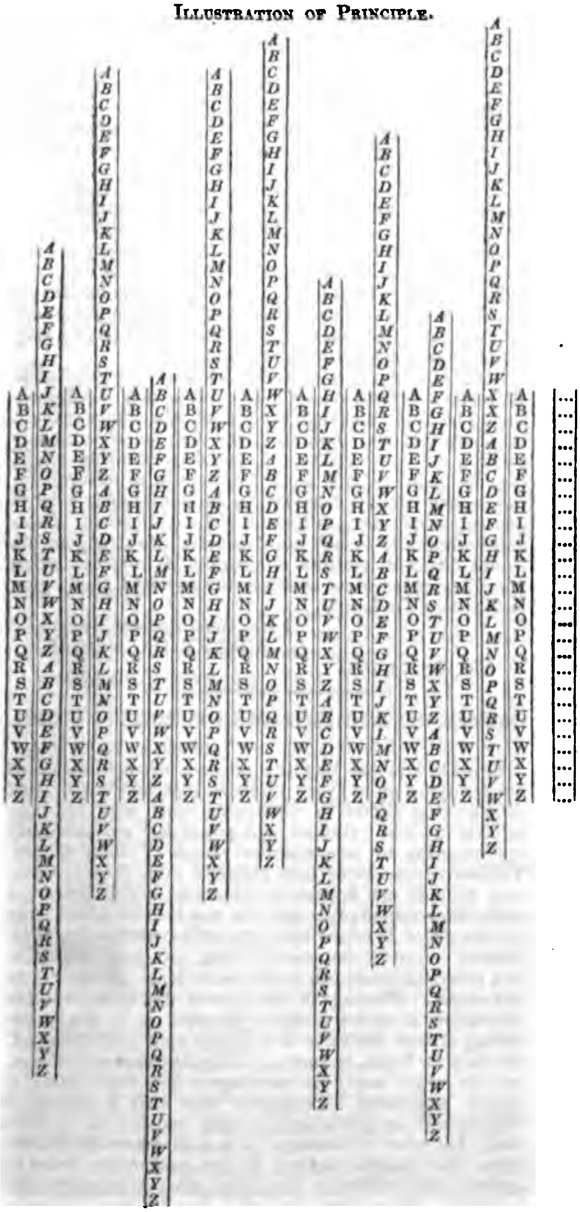
S. R.

Chiswick, July 29th, 1854.

SECRET, OR CYPHER WRITING.

SIR,—Permit me, through the "Journal of the Society of Arts," to make known a system of secret (or cypher) writing I have lately invented and patented the apparatus, and to enclose, for the acceptance of the Society, the apparatus devised for its practical application, which, I believe, will be found to answer all the purposes intended. It is formed, as you perceive, of a series of fixed alphabets printed in *black* letters,

ILLUSTRATION OF PRINCIPLE.



and these alternating with another series of double alphabets in *red* letters*; the latter moving in grooves. By this arrangement you can, at pleasure, form any word or words in a line with any letter on the fixed alphabets; for instance, you wish to form the word *telegraph* against K. Begin at the left hand, bringing *T* to the black K, then the next slide move down until *E* is opposite the second black K, and so on until you spell the word, removing the last slide, which is not required. This is the *key-word* to any writing you may wish to send; thus, you desire to communicate the sentence "I have had an interview." Begin by spelling from left to right, using the red letter as the cypher; opposite the I you find *R*, the H *B*, A *B*, V *P*, E *A*, H *O*, A *Q*, D *I*, A *X* (then return to the left, and proceed), N *W*, I *C*, N *O*, T *N*, E *A*, R *Y*, V *L*, I *N*, E *B*, W *F*, consequently, the cypher of this message would appear as R B B P A O Q I X W C O N A Y L N B F, which may be read by the party to whom it is sent, by fixing his key word as you did, viz., *telegraph* against K; he reads it by finding the first letter on the red alphabet, and using the black end against it, and so on. It will be seen that, even in this short message, the letter A is represented by *B*, *Q*, and *X*. *B* also represents H, A, and E. I, again, is represented by R, C, and N, and thus leaves no clue to the deciphering, which I feel certain is impossible unless the key-word is known. The same sentence written in the key of *microscope* against U would appear thus:—*A*, *V*, *I*, *S*, *Y*, *F*, *I*, *X*, *B*, *X*, *A*, *B*, *V*, *B*, *L T*, *Q*, *Y*, *R*; in this three *B*'s are together, representing N T E. You may thus vary your cypher *ad infinitum*, and each variation equally unable to be deciphered without the key, but with it is as equally easy. It must be at once apparent that the complexity may be much increased by permutating (on well-known principles) each of the moveable alphabets, and in many other ways; but, in its simplest form, which I have described, I believe it will be found as complete as need be. Of course, the reading and writing may be indifferently from the fixed to the moveable, or the contrary, from left to right, or the reverse; in fact, there is no limit to its variations, and which may be agreed upon by the parties corresponding. You can, with the little apparatus now sent, use a key to the extent of twenty letters; thus, your key is *physically impossible*; spell two letters at a time, using both the fixed and moveable alphabets. Sentences as keys may be used in like manner, and to any extent.

I need hardly observe that this system is applicable to any language. Its uses must be obvious to all, and the further employment of that useful help at the present day (the electric telegraph) certain, for by its means messages of the most private character may be sent, and not a chance of discovery. This fact I have proved, as by it I communicated with my friend Mr. Coathupe, addressing him from London, and on the same day, July the 20th, sent to the *Times* a short note, which appeared on the 21st, in the second paragraph, second column; it is this:—G Z Z E S, G V, T N S R X W V F U O, L X W V, Q B O J Z, F X H F J B X, Q X N O Z E O, S O, F R T G Y B M F, X Y — D U O B, S L U P, T A O B, V J P T Q R S I W, J T Z, S D, E J P L M O F F, Z U G Q S C G. *V. B. B. V.*, which interpreted by the use of the key word *Minerva* against H will thus read: "By this communication I claim precedence in the discovery of secret correspondence on the principle of permutation." The *V B B V*, is read by *J H B T* (my initials), as key from right to left against H; it then is proved to be J. H. B. T. It will thus be seen that this system may be used for establishing claims where publicity is not at first desirable.

To all public bodies, who are in the habit of enquiring by telegraph, it is evident it must prove useful, for, at

* The red letters are here represented by the capitals in italics. Of the four examples which Mr. Thwaites refers to, it has been considered necessary to illustrate only one.

most times, such enquiries are necessarily confidential; and to private parties at a distance from each other, it will prove a means of sending messages that are desired to be kept sacred to the parties communicating—and are there not many such cases? I might multiply instances without number where such a system will I trust prove a boon.

Thanking you for the space afforded me in your valuable journal.

I subscribe myself, yours faithfully,
JOHN H. B. THWAITES.

17, Park Street, Bristol, August 10th, 1854.

LIST OF LECTURERS.

SIR,—The committee of the Leek Mechanics' Institute sent you on the 22nd instant a list of professional lecturers, who have been engaged by them during the past session, and whose services were appreciated by their members. They have had some hesitation in doing so, as they doubt whether the present lecturing arrangements of the Society of Arts are calculated in any great degree to serve the interests of Institutions in Union, (especially since they are now requested, or invited, to include *gratuitous* lecturers on their list,) and instruct me to offer you their views on the subject.

As lecturing, of the sort required by Mechanics' Institutes, have now become a profession, and is followed by many men of considerable talent, it is entitled to proper support, and a fair trial of its usefulness or otherwise. This committee take it that one of the *principal* advantages to be expected from combination with your Society at present is in making such arrangements. This committee doubt in most instances the utility of donative or gratuitous lectures; indeed, except in one or two cases, have found them the *most expensive* and least satisfactory. The Institute must bear the outlays for printing, attendance, hiring of room (if they have not one of their own) &c., and the lecturer, in return, has as many tickets of admission as he may have friends or dependents who may wish or be expected to attend. Again, when a lecture is solicited from a clergyman or friend at a distance, his expenses are to be paid, and must be liberally covered; so that the amount paid in one way or another generally reaches what would satisfy many first-rate professional lecturers if taken on their circuit, And there is this also to be noted—the amateur generally *reads up* hurriedly for the occasion, and can scarcely be persuaded *he* is honoured by his position for the evening, but mostly fancies he confers an obligation. If lecturing is to be or do anything, it will be that men educated for it, devoting themselves to their subjects, and identifying themselves with the propagation of knowledge as such shall be received as *teachers* and duly remunerated. This committee therefore prefer the professional lecturer, as being (when proper judgment is used in the selection) more fully and extensively acquainted with his particular subject, having more confidence and ability in addressing his audience, as being the *cheapest* in proportion to information supplied, and as, by being a paid lecturer, he stands entirely on his own merits, is open to the criticism and calls forth the reflection and judgment of his audience—such, no doubt, ought to be the case with the amateur, but (especially in country places, and in the experience of this committee) is seldom so. They have had a few creditable exceptions from among their own members, (and these men who would rather address a discussion club or mutual improvement class than be called upon to make a public display), but they have found the objections above stated to hold good against the system. But what they apprehend to be the worst feature in gratuitous lecturing is, that it will tend to foster a spirit of pauperism and dependence, unhappily too prevalent already. Why should they *beg* indifferent teaching, when good may be had for the paying? Why not dread patronage, and cultivate independence, courage, liberality in collective bodies as honest men do individually. This committee (and it is to be hoped for the future of Institutions the committees and members of many others) begin to see which is the better, and more creditable course, and in time the most profitable in many ways.

On looking over last year's list this committee cannot help regretting that so much labour has been so much misapplied, and so much expense incurred to so little purpose, in giving the mere names and addresses of lecturers—which the lecturers give, with much additional information, in their circulars and programmes; but do not wholly blame the Society, as, having once sent out the circulars they no doubt felt bound to publish the returns, however unsupported in some cases by judgment or experience. But they much more regret that it should be again attempted, as it must have been apparent, from the want of interest in returning last year's list, that no great importance was attached to the plan.

Why not leave the profession to private enterprise? Almost every individual whose services are at all worth acceptance, sends out circulars and programmes to the different Institutions in Union, as well as many not so, generally stating where he has been previously engaged. Nothing simpler than for the secretary of one Institution to write to the secretary of another, in whose judgment he may have confidence, and obtain in most cases a very definite estimate of the lecturer's abilities,

But the most proper plan, if a list must be published at all, seems to be that once a year a convention of delegates should be held; and that there a certain number should be nominated and elected, or rejected, on clear understanding of their ability. A judicious selection might thus be hoped for, and a place on the list of lecturers for the Society of Arts would then be considered, what it certainly is not now, an honour and a distinction. Delegates might also at such meeting enter into arrangements to suit different localities or districts, so as to economise travelling expenses, of which lecturers would gladly give Institutions the benefit.

I am, yours respectfully,
ROBERT DALGLEISH.

Leek, July 25, 1854.

CAUSES OF THE FAILURE OF INSTITUTIONS.

Islington, July 26, 1854.

SIR,—At a period like the present, when Institutions are springing up in every direction like mushrooms, and disappearing almost as suddenly, those who feel any interest in their existence and prosperity are anxiously endeavouring to ascertain the causes of their failure. Various reasons have been assigned from time to time, why they do not flourish to the extent which, from the object they contemplate, and the vast benefits which they are calculated to confer upon the entire community, they deserve. Among the reasons urged, one (and I regard it as a principal cause) has been overlooked—I mean THEIR CHEAPNESS. The rage in the present day is to establish institutions at so low a rate of payment as to render necessary almost exclusive dependence upon gratuitous aid, not only for books, lectures, and the attendance of officers, but (in some cases) for newspapers and rent. Now, it cannot reasonably be expected that such a system of support will be permanent; it may succeed for a short time, but when withdrawn (as it most assuredly will be when the various motives for its continuance cease to operate) the Institution having no other resources to fall back upon, there is no alternative but to close its doors, and leave the payment of its debts, where there are any (and it is to be deeply regretted that there are but few Institutions in a perfectly solvent state), as a legacy to the committee. Literary, Scientific, and Mechanics' Institutes, when supported by *charity*, do not commend themselves to those for whose benefit they are specially designed; and never are their advantages so fully appreciated as when obtained at the cost of some little pecuniary

expense to those who avail themselves of them. To be *permanently successful*, an Institution must be founded upon a system of INDEPENDENCE and SELF-SUPPORT; and such system (due regard, of course, being paid to economy and proper management) can be carried out at a rate of payment within the means even of the humbler classes.

I remain, Sir,
Your obedient Servant,
JOSEPH SIMPSON.
Librarian of the Islington Literary & Scientific Society.

To Correspondents.

ERRATUM in No. 85, p. 590, col. 1, line 36.—For Gadesden, George Arthur, read Gadsden, George Arthur.

MEETINGS FOR THE ENSUING WEEK.

MON. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Professor Nichol, "On the Right Teaching of History, illustrating the Right General Method in Education."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Rev. Sydney Turner, "On Reformatory Schools."

TUES. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Rev. Vincent Ryan, "On the Relation of Foreign to English History."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Mr. Arthur Hill, "On Punishments and Rewards."

WED. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Rev. G. E. L. Cotton, "On the Necessity for an Extended Education to the Educator."

THURS. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Professor Hunt, "On Familiar Methods of Instruction in Science."

FRID. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Rev. A. B. Power, "On School Organisation, with Special Reference to the Use of Parallel Desks."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Dr. Guy, "On the Use of Tabular Forms in Learning and Teaching."

SAT. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Cardinal Wiseman, "On the Home Education of the Poor." No. 1.
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Mr. W. A. Shields, "On Object Teaching; illustrated."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Delivered on 3rd August, 1854.

Par. Numb.

406. Promissory Notes: Return.
411. Conveyance of Mails by Railways: Report from Committee.
422. Exchequer Bonds: Return.
423. Deficiency Bills, &c.: Return.
424. Balance in the Exchequer: Return.
435. Civil Services: Estimates, &c.: Class 7, Vote 1 (Revised Estimate).
257. Bills: Common Law Procedure (amended).
258. Bills: Militia (No. 2) (as amended in Committee, and on consideration of Bill as amended).
259. Bills: Mayo County Advances.
260. Bills: Public Health.
262. Bills: Crime and Outrage (Ireland) (amended).
Towns Improvement (Ireland) (Lords' Amendment).

Delivered on 4th August, 1854.

348. Medical Relief: Report from the Committee.
405. Spirits and Malt: Return.
431. Registration of Electors: Abstract of Return.
433. Revenue: Supplemental Estimates.
263. Bills: Russian Government Securities (amended).
264. Bills: Bills of Exchange and Promissory Notes (as amended in Committee, and on Re-commitment).
295. Bills: Militia (Scotland) amended).

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Aug. 4th*, 1854.]

Dated 10th May, 1854.

1046. J. Shepherd, Manchester—Compound steam engines.

Dated 3rd June, 1854.

1236. J. Renton, Vauxhall, and H. Attwood, Holland street, Blackfriars—Starch.

Dated 5th June, 1854.

1250. L. Brockelbank, Willesden—Lubricating matters.

Dated 1st July, 1854.

1443. T. R. Harding, Leeds—Pins of hackles, &c.

Dated 5th July, 1854.

1478. J. Venables and A. Mann, Burslem—Colour printing, ceramic, and other materials.

Dated 8th July, 1854.

1501. T. Waller, Ratcliff—Stoves.
1503. L. Tindall, Scarborough—Bruising grain, &c.
1505. Lord Beriedale, 17, Hill street—Paper.
1507. T. S. Whitworth, Salford—Wood machinery.

Dated 10th July, 1854.

1509. Dr. D. Beck, Southampton—Brewing and distilling.
1511. J. Swindells, Manchester—Vegetable fibre.

Dated 11th July, 1854.

1517. T. R. Harding, Leeds—Doffing fibrous materials from hackle cylinders, &c.

Dated 12th July, 1854.

1521. W. Houghton and R. Hoyle, Bury—Spinning machinery.
1523. M. Townsend, Leicester—Knitted fabrics.
1525. L. Cooke, Sowerby bridge—Preparing fibrous substances for spinning.
1527. T. E. Moore, St. Marylebone—Extinguishing fires.
1529. A. J. Loiseau, Paris—Fringes.
1533. C. D. Gardissal, Paris—Stamp safe.

Dated 13th July, 1854.

1535. W. Flitcroft, Bolton, and T. Evans, Manchester—Floor cloths. (A communication.)
1537. T. B. Foulkes, Chester—Self-adjusting gloves.
1539. L. Lawson, Paris—Printing.
1541. J. Hackett, Derby—Fastening India-rubber ends.

Dated 14th July, 1854.

1545. A. S. Stocker, 11, Poultry—Axles.
1547. C. Sewell, Sydenham—Spring hinges.
1549. J. Mc Gaffin, Liverpool—Corrugating angular iron.
1551. J. Derham, Bradford—Combing wool, &c.
1553. J. B. Dechanet and A. D. Sisco, Paris—Railway carriages.

Dated 15th July, 1854.

1554. E. H. Brindley, Longton—Ornamenting china, earthenware, and glass.
1555. J. Taylor, Burnley—Clothes peg. (A communication.)
1556. R. Waller, Manchester—Letters and figures, and affixing the same on glass.
1557. Capt. F. V. Guyard, Gravelines—Electro-telegraphic communication.
1558. T. Wright, 9, George yard, Lombard street—Permanent way.
1559. J. Ashworth, Turton—Permanent way.
1560. T. Summerfield, Birmingham—Chromatic glass and glass-faced bricks.
1561. W. Hunt, Tipton—Utilizing compounds produced in galvanizing iron.
1562. G. W. Kelsey, Folkestone—Air engines.
1563. M. F. Wagstaffe, 10, Walcot place west, Lambeth, and J. W. Perkins, 2, Poplar terrace—Obtaining metals from ores and oxides.
1564. J. Squires, Cleveland street, Fitzroy square—Boots and shoes.

Dated 17th July, 1854.

1565. J. B. Denton, Stevenage—Hoes and spuds.
1566. T. M. Woodyatt, Kinver mills—Consuming smoke.
1567. G. North, Lewisham road—Apparatus for protecting articles from being stolen from the person.
1568. W. Warcup, Bristol—Carriage springs.
1569. J. Lockhart, jun., Paisley—Bobbins.
1571. J. Livesey, New Lenton—Lace machinery.

Dated 18th July, 1854.

1573. H. Hitchins, King William street, City, and W. Batley, Dean street—Material for mouldings and medallions.
1577. A. E. L. Bellford, 16, Castle street, Holborn—Piston. (A communication.)
1579. P. Cato, Liverpool—Manger.
1581. A. Dalgety, Deptford—Reduction of friction.
1583. S. Mitchell, Dewsbury—Cards for carding wool, &c.

Dated 19th July, 1854.

1585. J. Whiteley, J. Slater, and W. H. Crossley, Halifax—Preparing and spinning machinery.
1587. W. Ball, Rothwell—Drills.
1589. F. H. Wenham, Brixton—Steam engines.

Dated 20th July, 1854.

1590. J. Sudbury, Halsted, and S. Wright, Clare—Taps and valves.
1592. J. B. Gillet, Agde (Hérault)—Capstans, winches, and windlasses.
1594. J. Barnes, Church—Furnaces.
1596. J. Hackett, Derby—Covering India-rubber thread with sewing silk.

Dated 21st July, 1854.

1598. T. Chambers, jun., Colkirk, Fakenham—Distributing manure.
1602. A. V. Newton, 66, Chancery lane—Metallic spring. (A communication.)
1604. J. Knight, Birmingham, and J. Stubbs, Oldbury—Bricks, tiles, pipes, &c.
1610. M. A. Stevens, Liverpool—Bonnets.
1612. H. Francis, Strand—Feeding fuel to furnaces.

Dated 22nd July, 1854.

1614. T. Firth, Huddersfield, and J. Wilson, Mirfield—Finishing woven fabrics.
1616. W. S. Losh, Carlisle—Bleaching.
1618. W. Johnson, 47, Lincoln's inn fields—Cleansing and dyeing fibrous material. (A communication.)

Dated 24th July, 1854.

1620. E. F. Hutchins, 263, Whitechapel road—Cylinders.
1622. J. H. Johnson, 47, Lincoln's inn fields—Preparation of silk. (A communication.)
1626. B. Cole, jun., Knebworth—Ploughing and grubbing machinery.

Dated 25th July, 1854.

1630. E. Hallum, Stockport—Spinning machinery.
1632. P. Spence, Pendleton—Sulphur from iron pyrites.
1634. W. S. Garland and J. Glasson, Soho Foundry, Stafford—Consuming smoke.
1636. J. Mc Gaffin, Liverpool—Heads to metal casks.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1653. W. B. Caulfield, 54, Cole harbour, Blackwall—Brushes for cleaning tubes of boilers.—27th July, 1854.
1671. P. G. Harris, Buckingham street, Adelphi—Locomotive engines. (A communication.)—29th July, 1854.
1673. E. Burke, Upper Thames street—Instruments for withdrawing corks and uncorking bottles.—29th July, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed August 4th, 1854.

992. William Tillie and John Henderson, Glasgow—Improvements in printing shirting fabrics.
283. Thomas Sullivan, Foot's Cray—Improvements in rollers and moulds used in making paper.
287. Auguste Louis Nicolas Comte Vander Meere, Paris—The manufacture of artificial whalebone, or a substance capable of being employed as a substitute for whalebone and tortoiseshell.
294. James Murdoch, 7, Staple Inn, Holborn—Improved process for manufacturing paper.
307. George Wigzell Knocker, Bushy Ruff, Dover—New method for producing rotatory motive power by means of water.
340. Jacques François Dupont de Bussac, 36a, Upper Charlotte street, Fitzroy square—Improvements in paving and covering places.
343. Thomas Edwards, 169, Broad street, Birmingham—Improved fastening for articles of dress.
367. Thomas Jennings, Brown street, Cork—Improvements in stoppers for bottles.
417. James Smith, Glasgow—Improvements in ornamental weaving.
463. Constant François Bekaert, 10, Rue de la Victoire—Improvements in linseed oil for painting, called oxigenated oil.
479. Frederick Samson Thomas, 17, Cornhill—New rifle carriage.
490. Thomas James Johnson, 19, Booth street, Spitalfields—Improvements in apparatus for roasting malt.
505. John Simon Holland, Woolwich—Improvements in locks.
516. Timothy Yates and Rufus Yates, Bury—Improvements in looms.
651. Edouard de Mars, Paris—Improvements in windlasses or capstans. (A communication.)
690. Richard Montgomery, New York—Improvement in corrugated metals, and in machinery for producing the same.
861. Samuel Colt, Spring Gardens—Improved machinery for cutting or shaping metals. (Partly a communication.)
960. Joseph Barling, 7, High street, Maidstone—Improvements in treating the hop bine, and rendering it applicable to the manufacture of paper and other articles.
969. Christopher Kingsford, 18, Buckingham street, Strand—Improvements for solidifying or indurating peat, soft, small, or pulverized coal, and other substances of a like oleaginous or bituminous nature, and machinery and apparatus for effecting the same.
1015. Josiah George Jennings, Great Charlotte street, Blackfriars—Improvements in the manufacture of earthenware pipes for drains and sewers.
1017. Josiah George Jennings, Great Charlotte street, Blackfriars—Improvements in apparatus for regulating and supplying water for water-closets and other purposes.
1052. Henry Doulton, High street, Lambeth—Improvements in kilns used in the manufacture of stoneware, earthenware, and china.
1076. Thomas George Shaw, Old Broad street—Improvements in apparatus to facilitate the decanting of wine and other liquids.
1129. Robert Crosland and William Holiday, and John Heaton, Bradford—Improvements in apparatus employed in the manufacture of cast-metal pipes or tubes.
1160. Thomas Ball, Nottingham—Improvement in manufacturing ornamented looped fabrics.
1196. Henry Doulton, High street, Lambeth—Improvement in the manufacture of junctions for sewers and drains.
1201. Edward Loysel, Rue de Grétry, Paris—Improvements in grinding or pulverizing vegetable substances, and in obtaining infusions or extracts from tea.
1217. James Timmins Chance, Glass Works, near Birmingham—Improvements in machinery for roughing or preparing the surfaces of glass.
1226. Moses Poole, Avenue road, Regent's park—Improvement in cop-tubes for mule and other spindles, and machinery for making such cop-tubes.
1228. Isaac Taylor, Standford Rivers—Improvement in producing thin metallic shells adapted to printing.
1231. Peter Armand le Comte de Fontaine Moreau, 4, South street, Finsbury—Improved fuel.
1239. Abel Franklin Goodnow, New York—Improvement in scythe snaths, or the manufacture thereof.
1257. Nehemiah Brough, Birmingham—Improvements in the manufacture of buttons, and in attaching them to articles of wearing apparel.
1276. James Lamb Hancock, Neath—Improvement in cutting hay, straw, and other fibrous articles and substances.

Sealed August 8th, 1854,

308. John Perry, Leeds—Improved drilling machine.
329. Joseph Johnson, Manchester—Improvements in apparatus to be used for the preservation of life at sea.
334. Armand Jean Baptiste Louis Marcescheau, Paris—Improvements in locomotive engines. (Partly a communication.)
341. George Ayres, City road, London—Improved clip or file for holding papers or other articles.
345. Daniel Campbell and James Barlow, Accrington—Improvements in looms.
346. Edmund Clegg and Edmund Leach, Rochdale—Improvements in slubbing, spinning, drawing, twisting, doubling, and winding wool, cotton, silk, flax, and other fibrous substances.
358. Samuel Perkes, Walbrook—Improvements in valve cocks.
362. John Hossell, Regent road, Salford—Improvements in machinery or apparatus for washing, scouring, and squeezing leather or other similar substances.
363. John Potter, Manchester—Improvement or improvements in machinery for preparing, spinning, and twisting cotton or other fibrous substances; applicable also to machinery for winding threads or yarns of the same.
411. John Gedge, 4, Wellington street, South Strand—Improvements in the construction or adaptation of certain fittings for gas.
419. Adam Dixon, Smethwick—Improvements in railway axle-boxes and bearing springs.
420. Adam Dixon, Smethwick—Improvements in timber, scaffolding, or stageing.
427. Damiano Assanti, Upper Berkeley street—Means of rendering porous substances waterproof.
455. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn—Improvements in machinery for dressing stone.
481. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn—Improvement in the means of admitting the steam, or other motive-power agent, to, and exhausting it from, the cylinders of oscillating engines.
518. Lorenzo Tindall, Scarborough—Improvements in churns.
532. John Knox Stuart, Glasgow—Improvements in hats and other coverings for the head.
535. James Galloway, Bolton-le-Moors—Improvements in the construction of cocks, taps, and valves.
748. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn—Improvements in breech-loading fire-arms.
878. Auguste Edouard Loradoux Bellford 16, Castle street, Holborn—Improvements in the manufacture of steel and wrought iron directly from the ore.
1066. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn—Improved method of retarding the process of decay in flour, meal, grain, and other vegetable substances.
1128. William Crighton and Andrew Crighton, Manchester—Improvements in machinery or apparatus technically called beaters, used for opening, cleaning, or otherwise preparing cotton, wool, or other fibrous substances.
1156. Joseph Lillie, Manchester—Improvements in looms for weaving.
1168. John William Jeakes, Great Russell street—Improved construction of stove grate.
1241. Alfred Garratt Barham, Bridgewater—Apparatus for damping or moistening the adhesive surfaces of stamps or labels.
1259. Charles Anthony Perpigna, Paris—Improved apparatus for effecting the combustion of smoke in fire places.
1277. John Currie and Robert Young, Glasgow—Improvements in the treatment and grinding of grain and the products thereof.
1296. John Hargrave, Kirkstall—Improved machinery for washing, scouring, and felting or fulling.
1298. Frederic Martini, Elberfeld, Prussia—Improvement in working steam engines.
1306. Richard Hornsby, Spittlegate Iron Works, Grantham—Improvements in portable thrashing machines.
1311. Frederic Martini, Elberfeld, Prussia—New and improved construction of steam engines.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Aug. 3.	3625	Preservative Needle Wrapper............	Joseph Mogg and Co.........	Adelaide Works, Queen street, Redditch.

Journal of the Society of Arts.

FRIDAY, AUGUST 18, 1854.

Educational Exhibition.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £1,027 15s. 6d., including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

FOURTEENTH LIST.

Edwin Chadwick, C.B. . . £2 0 0

ABSTRACTS OF PAPERS, LECTURES, AND DISCUSSIONS.

Saturday, July 29th, at 5 p.m.

On the Relations of History, Biography, and Political Economy to Other Branches of Knowledge. By Professor Creasy, A.M., &c.

The lecturer discussed the various definitions of history, especially that of Niebuhr, who classifies all history as consisting of—

1. The knowledge of the circumstances in the midst of which events occur.
2. The knowledge of events themselves.

He pointed out how very comprehensive the first branch of this definition is—embracing not only the knowledge of institutions, laws, social customs, manufactures, science, and the like, which are the result of human actions; but comprising also the knowledge of geography, geology, physiology, botany, natural history, mineralogy, and other things which are not the result of human action.

The lecturer stated that these last sciences are more properly the antecedents of history than integral portions of history. The same remarks were made on the science of ethnology. The importance of these antecedents in order to study history properly was pointed out.

The question naturally will be asked, "Is all this to be mastered before any history is learnt?" Certainly not. The child learns history in a thousand ways; whilst acquiring other branches of knowledge he cannot help learning it; there is a natural craving for historical knowledge. As youth passes on to manhood, the season for action approaches—the season when man becomes conscious of what Arnold has termed "the highest earthly desire of the ripened mind, the desire of taking an active share in the great work of government." Then is the value of history; as it must be looked upon as fitting a man for his political duties. The man who, by his vote, his writings, or otherwise, takes any part in influencing the policy of England, begins to *make* history. To qualify himself for this he ought to make history his special study. The field is immense; not only because there are many nations and many ages, but because there are the histories of progress, *e.g.*, the reformation, civilisation, discovery, commerce, philosophy, painting, &c. Political history may be deemed the primary and most important division. This subdivides itself into the State in its *external* life, such as wars, treaties, &c.; and its *internal* life, such as government, laws, social conditions, &c.

Virgil points out that the arts of legislation and government, as well as the arts of civilization, were the province of the Roman. These are the materials of history Whilst others *made* literature, rhetoric, astronomy, &c., the Romans *made* history. The English, *i.e.*, the Anglo-American, *makes* history even more than the Romans did. The study of history is the best training for the *making* of history. These principles give the clue for selection in historical study, at least for the Englishman and the Anglo-American. All history is useful, some is indispensable; some may be merely read, some must be studied. The three histories which are commonly preferred as special objects of study are the best, viz., the Greek, the Roman, and the English. The last needs no explanation. It is enough that it is our own history, though it is easy to show its special merits. Why are the Greek and Roman chosen? One reason is the connexion of all history. The Greek leads to the Roman, the Roman to the Romano-Germanic—the Christiano Romanic—Germanic—Mediœval European—Modern European. This, however, is not the main reason, or it might be asked why not take the Assyrian, Egyptian, &c. The true reason is, those nations best deserve study among whom *true* principles have been most developed. These principles are Institutional Liberty and Individual Energy. This is history —"Philosophy teaching by Example." For a more extended course of reading in modern history, the lecturer advised taking the German empire as a good central line. The study of English history would necessarily embrace that of France and Spain, our colonies and dependencies.

The lecturer then proceeded to point out the mode of studying history:—1st. The General View. 2nd. Special Biographies; and 3rd. The Special Study of Institutions. The value also of sets of leading scenes must not be underrated, and the lecturer concluded by showing the immediate bearing of history on law, political economy, and government.

Friday, August 11th, at 5 p.m.

On Economic Science. By William Ellis, of Camberwell.

Among the great events of the age in which we live, although many are more striking, few perhaps have been more fraught with benefit to mankind than the altered state of public opinion in regard to the principles of economic science.

Having learned to read the recommendations of this science, and to respect the laws comprised within it—a disregard of which is ever privation and not unfrequently severe suffering—in our own country, at all events, man in his legislative capacity has emancipated industry from most of its shackles—has purged his system of taxation from the waste and annoyance of differential duties—has turned colonial intercourse into an interchange of benefits, instead of mutual detriment under restrictions—has given a free scope to commercial transactions, and has abandoned usury laws and other attempts to prevent the flow of capital to those agents by whom it is most likely to be turned to account in producing an abundance of the necessaries and comforts of life for the benefit of society at large.

The works just mentioned are what we have done *legislatively*. The works now about to be mentioned are what we are going to perform, or rather what we have already begun to do *educationally*. For we are at last, happily, arriving at the conviction that, great as may be the blessings secured by regulating our public acts in accordance with the principles of economic science, they are as nothing compared with the blessings in store for us when we shall have succeeded in regulating our private conduct in accordance with those same principles.

It is of man's conduct so far only as it bears upon his command over the necessaries and comforts of life that economic science treats *directly*, although it may be said to treat *indirectly* of man's conduct in general, for an abundance of the necessaries and comforts of life is indispensable to the prevalence of good conduct. Few who have thought much of man's nature, his wants and propensities, and the temptations to which he is exposed, will be disposed to question the correctness of this statement, with which, also, all our statistics are in perfect keeping. The conduct, besides, which is recommended by economic science as a means of procuring abundance of the necessaries and comforts of life is the very same as that which is recommended by the moralist who contemplates man from a more comprehensive point of view. He will, of course, combine with those rules of conduct other rules not strictly deducible from economic science, aiming at wider purposes and enforced by different sanctions.

A simple enumeration of some of the more obvious deductions from the principles of economic science will suffice to rivet the attention of every intelligent educator. To enjoy abundance of the necessaries and comforts of life, men must work assiduously, intelligently, and skilfully, they must make provision out of present earnings for future wants, they must respect property, and they must perform engagements with fidelity. Differently expressed, abundance of the necessaries and comforts of life will be enjoyed by mankind in proportion to the prevalence of industry, knowledge, skill, economy, respect of property, integrity, punctuality, and sobriety. But the dependance of abundant supplies of the necessaries and comforts of life upon a prevalence of these qualities is not more certain than is the dependance of a prevalence of these same qualities upon the care with which knowledge is imparted to, and habits and character are fostered in childhood and youth, upon the care with which all the young are made to come under the influence of good teaching and training. Nothing, then, can well be more simple than what economic science enjoins to educators or to those who set education in movement. Perform these duties towards the young and abundance will cover the earth. Neglect them, and scarcity and destitution will afflict society. Perform these duties, and labourers will have sufficient wages, capitalists remunerative profits, and landlords appropriate rents—each industrial class and subdivision of classes achieving comforts for itself, while it promotes the general well being. Neglect these duties, and wages, profits, and rents will be insufficient, and all classes, while dissatisfied with their respective shares, will be looking to what others possess as the cause of their own privations.

A survey of society, even in our own age and country, with all its comparative advantages and its recent improvements, discloses to us much of want and suffering, considered by almost universal consent as susceptible of mitigation and diminution in the future. And here the lecturer would earnestly invite the educator's attention to the different means resorted to for the purpose of circumscribing human suffering by those who reject, and those who accept, the instructions of economic science. The mention of a few of them will serve the purposes of illustrating the truth or of exposing the fallacy of what has been claimed on behalf of economic science.

Let us begin with the notoriously insufficient wages of large number of labourers in various departments of industry. No subject has more deservedly attracted the attention of philanthropists. Widely different are the causes to which these insufficient wages have been attributed—no less so the proposals that have been offered and the attempts that have been made in order to raise them. By scorners of economic science, insufficient wages have been attributed to the grinding of farmers, of manufacturers and of other employers of labour, to the introduction of machinery, to exorbitant rents incapacitating employers from paying what they could wish, and foreign competition. In harmony with these views, the means suggested to increase wages have been to form combinations of workmen, to discourage and obstruct the introduction of machinery, to remonstrate with masters, nay, to denounce them as a species of unfeeling monsters, to vituperate landlords, and as far as possible to compel them to abate a portion of the rents to which they are entitled from their tenants, and to impose restrictions upon foreign commerce.

The student of economic science has not failed to dwell long and painfully upon that most sad and yet interesting social phenomena, an insufficient rate of wages; nor has he slightingly passed by, unexamined, the various means thus confidently recommended to abate an evil, the consequences of which must be misery in one or more of its many shapes. Having examined these means, he has convinced himself not only of their inadequacy to accomplish what is proposed to correct the evil, but even that their operation must be to act rather as aggravants than as mitigants. More than this, rising from the negative to the positive, he has pointed out that insufficient wages, whether prevailing generally or locally, may even be traced to errors of conduct in the labourers themselves, originating sometimes in ignorance, sometimes in defective habits, but more frequently in the two combined; and that consequently no improvement of wages can be reasonably expected from any efforts which do not aim at effecting an improvement in conduct. If the economist be justified in this conclusion, he must necessarily appeal to the educator for his assistance, since how is improved adult conduct to be expected, when childhood and youth feel the want of that teaching and training essential to the right conduct of maturer years?

Turning next to those social disorders which make themselves felt through farmers, manufacturers, merchants, and employers and directors of labour in general, such as bankruptcies, commercial panics, and a wide-spread suspension of works, they have been attributed to want of money, or to some inexplicable agency, whose spasmodic attacks, beyond the power of man to avert, demand the interposition of some supernatural government or bank to mitigate. Hence the call for inconvertible paper, and for loans on indifferent securities, to the prejudice of the lenders, whether the government, as representing the whole nation, or some individual or combination of individuals, and to all who would borrow on good security. The economist has had occasion, in common with others, to deplore these industrial calamities, to investigate the causes of them, and to search for antidotes of these causes. He has convinced himself that the fearful calamities under consideration are effects of very different causes, and that the measures proposed would rather extend than diminish the disorder for which they were meant to be remedial. He has gone further; he has traced suspensions of payment and bankruptcies to the misuse of credit—itself a consequence of ignorance or of bad habits, or of the two combined. He has thus again pointed to a remedy specially demanding the educator's co-operation, which if slow cannot fail to reach the seat of the disorder—better teaching how to supply the knowledge how to use credit, and better training to form the habits through which the knowledge must be applied.

He would refer to one more economic problem, that want of means bordering upon absolute destitution, which we everywhere see more or less around us. Its contemplation unrelieved is intolerable to all benevolent people, whether they despise or regard the exhortations of the economist. Their action is to relieve the destitute. Some organize societies for the gratuitous distribution of bread and coals, and for exploring the holes and corners in which misery tries to hide itself. Others open and maintain soup-kitchens and shelter for the houseless. But the votary of economic science who acts up to the precepts which he has gathered from his studies, is not content to rest here. His eyes having been opened

to the causes that have led to the destitution which he is called upon to relieve, he cannot, he dare not, connive at their being allowed to work unheeded and unopposed to produce a never-ceasing supply of miserable objects in the future. While stretching out the hand of charity, the opportunity is presented to him of verifying in detail the soundness of those economic principles by which he feels he ought to guide his conduct. As the objects come before him to receive the inadequate pittance which alone charity is capable of doling out, he finds few, the history of whose previous lives he is able to investigate, that he must not enumerate as the victims of ignorance, of idleness, of wastefulness, of drunkenness, of dishonesty, or of all combined—the victims, in short, of that want of good teaching and training in which social defects take their rise. And here may be noticed one of the many unjust charges which have been brought against the votaries of economic science, who are not, any more than the votaries of other sciences, to be made collectively answerable for every crude and rash expression uttered in their name. They have been represented as averse to the relief of the destitute, and as discouraging the charities of life. Such charges are utterly undeserved as applied to the true and faithful interpreters of the science. They do, it must be admitted, try to keep within bounds any feelings of exultations or of self-satisfaction that may be awakened in the charitable by the joyful tears and grateful thanks of the objects of their charity. "Hold," say they, "you have but begun—you have not yet completed your work. The larger call upon your exertions remains to be made. You have to prevent future, as well as to relieve present, destitution." The individual who, while he neglects the first and greater duty, performs the second and lesser, escapes any severity of comment, because we are too glad to welcome everybody who contributes his mite towards mitigating human suffering. But individuals in the aggregate, or society, who allow the causes of misery to flourish unheeded, let them be as active as they may in dealing with effects, must be condemned as tainted with one, at least, of two very serious defects—want of intelligence or want of benevolence.

In the present lack of agents thoroughly qualified to participate in the great work before us, that is of qualified educational agents, it must be confessed that the prevention of destitution is something remote—its diminution to be expected only by slow degrees. But there is this remarkable difference between attempts to relieve destitute individuals, and attempts to prevent destitution. The former, as you look at each separate case, one after the other, seem immediate and effective, and yet collectively and eventually they are inadequate. While the latter, though apparently distant and uncertain in their operation, collectively and eventually must be crowned with success. The ignorant are ever more ready to award praise and sympathy to those who deal with *effects* than to those who attach themselves to *causes*. They applaud the association which gives bread and coals to the indigent, and the dispensary which administers medicine to the victims of typhus and cholera. Knowledge is required to appreciate the efforts of the sanitary physician who keeps away fever, and of the educator who keeps away indigence, by preventing the causes in which they originate.

The lecturer called on his hearers to observe that in his opinion economic science proffers most valuable assistance to the educator who aspires to make his teaching and training instrumental in preventing or diminishing human suffering. It is the essence of the educator's calling, at all events, to aim at future effects through present work. He does not superintend a refuge for the destitute—he so superintends and directs the children under his care as to qualify them to keep away destitution from their future manhood. He is neither the surgeon nor the policeman, to watch over the dissolute and the drunken—his high office is to keep away, to exorcise profligacy and drunkenness, through the influence of knowledge, example, and habits, which, after a time, make vice almost impossible.

FRIDAY AUGUST 11th, at 8 p.m.

ON SCIENCE IN THE MINES. BY HERBERT MACKWORTH, M. INST. C.E., INSPECTOR OF COAL MINES.

The history of the progress of mining science is in fact the history of mining. Although there are traces of mining at a very early period in Britain for tin, lead, iron, gold, &c., it was not until the 16th century that it began to rise to its present importance. About that period coal was first employed at Newcastle for other purposes than burning lime or blacksmiths' fires, and a small quantity of copper was first sent from Cornwall to South Wales to be smelted. In 1726, 5000 tons of copper ore were raised in Cornwall; the production now amounts to 182,000. The supply of coal to London in the year 1700 was 470,000 tons; it now amounts to upwards of 4 million tons per annum, and the whole production of Great Britain to 54½ million tons. The production of iron in the year 1750, before the use of pit-coal for smelting, is stated at 30,000 tons; it now exceeds 2¼ million tons annually.

The first steam-engine for pumping water from mines was applied at the Griff colliery, near Coventry, about 1700. The Cornish pumping-engine performing a duty of raising upwards of 100 million pounds a foot high, by the consumption of a bushel of coals, presents the highest economy which has hitherto been attained by machinery. For improvements in winding, we are especially indebted to Newcomen, Smeaton, and Watt. The winding engines are sometimes of 200 horse power, and raise 2 tons at a time. Guides down the shaft answers the same purpose as the rails on a railway; wire ropes which are half the weight of hempen ropes are fast taking the place of the latter. The underground haulage, by the application of mechanical science, has been reduced to one-third of the cost, and yet the majority of mines proceed on the whole system. The guides in shafts alone save their cost twice over the first year, and yet hardly a dozen of the metallic mines have adopted them.

The scientific principles of ventilation were laid down by M. Jars, in 1764. In 1760 a Mr. Spedding, of Newcastle, first carried the air in one current into every part of a mine, but it was left for Mr. Buddle, in 1813, to introduce the greatest improvement in modern ventilation, the splitting of the air, which is simply providing several channels for the air to pass through the workings in lieu of one. By this means a much larger quantity of air, and consequently in a purer state, flows through the mine. To Humboldt, in 1796, we are indebted for a safety lamp to enter poisonous gases; and to George Stephenson and Davy, in October, 1815, for the splendid invention of a safety lamp for mines containing carburetted hydrogen, which has now sustained a trial of thirty-eight years, without one well-ascertained case of failure. Not more than three per cent. of the explosions of firedamp occur in mines where safety lamps are professedly used. The ventilation of English coal mines is generally produced by a furnace, which, being kept burning at the bottom of the upcast shaft, heats or rarifies the air, so that it ascends, whilst cold air necessarily descends another shaft into the mine to supply its place. In Belgium, where the science of ventilation is much better understood than in England, the furnaces are all being replaced by machines which pump out the air, and are more economical. They are also in that country, he regretted to say, much in advance of us in having carried out strictly the principle of ascensional ventilation, which prevents any light gas from collecting in a mine. We have much to learn from the continent in regard to the safety of mines, in boring, in machines for raising men, in the method of extracting the whole of the minerals, and in coking.

Borings have been executed to a depth of 764 yards; shafts of fourteen feet in diameter have been bored by

machinery, and at Homberg a boring is now being executed to a great depth to obtain water of a sufficient temperature for hot baths without the intervention of fuel.

A stimulus was given to improvements in mining in Belgium by the premiums awarded in 1840 by the Royal Academy of Sciences, and since that time greater progress has been made in the application of science to mining in Belgium than in any other country in a similar period.

In every part of a miner's education and a miner's practice science can and ought to hold the first place; for, though we possess many men of genius and industry, who, after having laboriously groped their way for years, have given to their undertakings the touches of a master's hand, yet in the interval how much has been lost to the country in the relinquishment of deep mines. And if we could analyse the long mental process, it would be seen how largely these men had imbibed from time to time the important truths developed by educated minds of deep thought. It must not be forgotten that this experience has often been attained at a great expenditure of life, time, and money. Enormous are the sums which have been squandered since the publication of William Smith's geological map in 1816, in fruitless searches for coal in the Oxford clay, in the millstone grit of the south and centre of England, in the black slates of the Silurian, and at Kingsthorpe, in the lower lias and oolite. At the latter place, after an expenditure of 30,000 pounds, the work was stopped by the influx of the saline springs of the new red sandstone, and yet another company is being formed to prosecute the luckless enterprise. In other places losses have occurred from mistaking blende for spar or lead-ores; calamine thrown into the smelting furnace, under the impression that it was iron ore, speedily undeceived the ironmaster; thousands of pounds worth of the sulphide and black oxide of copper have been thrown away as worthless.

On the other hand, by Professor Plattner's discoveries, gold ores in Silesia, which contain one grain of gold in 228,000, have been made to pay for working, and in Siberia similar ores, containing only one grain in half a million grains of sand. As an example of the successful application of science and perseverance, the discovery of gold in Australia by Mr. Hargraves, the honoured pioneer of the Australian El Dorado, might be cited; and through that gentleman's kindness he was able to exhibit some choice specimens characteristic of the different localities.

In giving a hasty sketch of the efforts which have been made to introduce mining education, the first place must be conceded to the academy of Freiberg. It was founded in 1765, and reached its celebrity in 1775, under the famous Werner. Pupils are to be found there from the most distant countries—Spain, Russia, and the Brazils. Some of the most improving proprietors of mines and smelters in this country have taken advantage of the education it affords. Besides the general classes, there is one for managers or captains, of whom the number is restricted to forty. The course consists of arithmetic, geometry, art of mining, elementary mineralogy, grammar, and drawing.

For an account of the celebrated schools of Schemnitz, Tarnowitz, and St. Etienne, a pamphlet by Professor Warrington Smyth should be referred to.

The mining schools at Liege and Paris, established in 1810, at which the government engineers pass a three years' course and four severe examinations, are schools of the highest character. At Alais, in the department du Gard, a school for master miners, under the direction of M. Etienne Dupont, affords many useful suggestions for the class of mining schools which are chiefly required in this country.

The School of Mines, under the able presidency of Sir Henry De la Beche, although distant from the centres of mining operations, has the advantages arising from the geological survey, from the fine museum which illustrates it, and from the records and laboratories. Field instruction is given in geology, mineralogy, and paleontology. Useful as this institution at present is, as a centre for mining information, it may yet hold a still more distinguished position as the active supporter of the mining schools which are now being formed in the principal districts. Other institutions, which have afforded scientific information applicable to mining, are deserving of mention, as Durham University, the course at which began in 1838, Dublin University, and King's College, London, where in 1831 the united efforts of three eminent professors were able to supply a want, long felt, for education in the applications of science.

In the month of May in the present year, a meeting of the coal trade of Great Britain was held in London, at the request of a committee of the House of Commons, at which resolutions were passed, recommending that a central mining school, with branches therefrom, should be established in some suitable colliery district. This was followed by a strong recommendation to Her Majesty's Government, embodied in the report of the committee of the House of Commons.

There are at the present time four mining schools, which are about to be commenced by the exertions of the proprietors and managers of mines. The seed sown in Cornwall by Sir Charles Lemon, in 1838, is bearing fruit. 1,500 pounds is already subscribed, and a county meeting is called for the 12th of September, to inaugurate a central school at Truro. The Newcastle school, which is being formed under the auspices of Mr. Nicholas Wood, and the North of England Institute of Mining Engineers, will, it is expected, be in operation before the end of the year. As much may be said of schools now forming at Bristol and Swansea; only that morning he had received a letter from a colliery proprietor, offering to subscribe 30 pounds annually for this purpose.

MONDAY, AUGUST 14th.

The Secretary regrets that Professor Nichol and the Rev. Sydney Turner have not been able to furnish abstracts of their lectures for this week's number, but trusts they will be able to do so next week.

TUESDAY, AUGUST 15th, at 5 p.m.

ON THE RELATION OF FOREIGN AND ENGLISH HISTORY. BY THE REV. VINCENT RYAN.

The importance of the study of history, if we profess to make it a part of education, is to train the citizens of a state to appreciate its institutions and their privileges under them. Yet history is seldom taught in a profitable manner. Its events are too often grouped together in the memory, like beads on a string, instead of being to the mind germs of thought and reflection. The teacher who thus deals with history will soon find the repetition of his work dull and insipid; the pupil who is thus taught will strengthen no faculty but memory. He who attempts to make instruction about past times represent *the real state of the case*, will be led to adopt methods for teaching even the elements of history, which will keep the subject fresh in his own mind and make it suggestive to his pupils. A boy might repeat ten or twenty times the fact that William Rufus was killed by an arrow glancing from a tree, without having any true ideas about the English history of that period. But if the question, How would the news of that event be taken from Winchester to York in those days? were properly answered to him, there would be materials for thought presented to his mind, and for comparison of past times with his own. What he knew before might be brought to bear on what his teacher had just told him. And as the line of illustration which runs along the progress of the nation in civilization supplies one method of making history interesting and useful, so another course might be taken, showing the several stages of advances which have been made in the laws of the land. The decrees of good

kings and the struggles of the people with bad ones, may be practically most interesting, as showing the way in which by God's good providence the blessings of liberty have been secured to the inhabitants of these realms.

But the particular illustration of our own history with which we have to do is one which rather tends to show the great proportion of certain events when we take *other lands besides our own* into the account. The first method we mentioned would make us compare an old itinerary with Bradshaw's Railway Guide; the second would require the help of those who have recorded and simplified the history of the constitution and laws of our country; the last will make us always have the map of Europe by us when we are dwelling on the history of England. If the reign of Henry VIII. be taken to show how this is done, on looking at the map of Europe we see that in 1520 there was a monarch, Charles V., who, either by hereditary right or election, ruled the Low Countries on one side of France and Spain; and on the other, Austria, Naples, Sicily, and the empire of Germany; while the wealth of the newly-discovered world was poured into his coffers. Turkey, France, and England were the only other powers of much consequence in the history of that period. Russia was remote and obscure. Sweden and Denmark had no leading influence. Having looked at his position let us now see how he used it. He visited in a hostile or peaceful manner Germany nine times, Spain six times, France four times, Italy seven times, the Low Countries ten times, England twice, Africa as often.

What, then, were his relations with England? His aunt was married to the king, and an English lady, Margaret of York, had much to do with his early education —and it is supposed that this circumstance predisposed him to make a visit to England, to which he was decided for graver reasons. On looking at the map again, we see Calais, the key to France, and opening an easy passage into the Netherlands, in the hands of the English. Francis I., King of France, and Charles V. are at variance. The alliance of Henry is of the utmost value to both sides for the impending war. Francis invites Henry to the pageants of the Field of the Cloth of Gold. Charles, in one of his voyages from Corunna to the Low Countries, lands at Dover. The result—Wolsey is attached to the Emperor's interests—the French king is left embarrassed, distressed, and almost brought to ruin. The very fact of the Emperor's success, however, brings Henry round to the French king's side, and a league is formed against Charles, of which Henry is protector.

Without going more into detail it is clear that in forming an estimate of Henry's character and actions we must refer to the use which he made of his position in Europe, as well as to his acts in his own kingdom. The difficulty and the responsibility of Edward VI.'s position appears in its strongest light when we remember the power of the Emperor, who actually interfered with that king's privy council—his ambassadors representing to them that any restriction of the Princess Mary would be regarded as a wrong done to the Emperor himself. The councillors were afraid of the displeasure of so powerful and victorious a prince, but the king could not be induced to give way, and thus the power and the conquests of Charles V. illustrate the firmness of Edward VI. In Mary's reign the connection is not only close, but critical. The marriage of Mary to the son of Charles, was part of a scheme for universal monarchy. Wyat's insurrection arose directly out of the instinctive fears of the people lest England should become a mere province of Philip's dominions, and the loss of Calais was in great measure occasioned by the suspicion which the nation entertained of Philip's designs. He had earnestly recommended that the garrison should be strengthened, which was not done, chiefly because of those suspicions. The intense grief of Charles at the loss of Calais is mentioned by Stirling as very natural, when we take into account the relations of his son's dominions to those of England at the time. The connection of the Armada with these previous circumstances is obvious.

Two important ends would be secured by introducing into our method of teaching English history this reference to the leading events of contemporaneous European history.

1. To give to the teacher *freshness of mind* while occupied in *sameness of instruction*.

2. To give to the learner a view of events in their true importance. Charles's unpretending visit to Dover was far more important, in reality, than the magnificent ceremonies of the Field of the Cloth of Gold.

Brief allusion was then made to two other periods, when a view of the map of Europe was essential to anything like a true understanding of English history. These were the reign of Louis XIV., whose conquests were enumerated, and Napoleon Buonaparte, who overran all Europe, except Russia and England. With reference to the present war the comparison stands thus—in the sixteenth century England and France united against an Emperor who had one arm in the Netherlands, the other at Corunna; now they are united against an Emperor who has one arm at Cronstadt, the other at Sebastopol. How different his power to do harm.

TUESDAY, AUGUST 15th, at 8 p.m.

ON REWARDS AND PUNISHMENTS. BY ARTHUR HILL, PRINCIPAL OF BRUCE CASTLE SCHOOL.

The lecturer began by remarking that as rewards and punishments, however necessary, are evils, it must be desirable to reduce them, both in weight and number, as far as practicable, especially punishment, as being the greater evil, of which, therefore, he should treat first, and on the present occasion perhaps alone. The objects generally aimed at in the use of punishment were the promotion of industry, respect, order, and morality; and it was important to inquire how far the end might be attained by other means. The true end must be a permanent rather than an immediate effect, and this could be secured only by raising up durable motives. In direct relation to industry these were love of knowledge, love of employment, desire to please, sense of duty, desire of the benefits dependent on knowledge, force of example, and emulation. On this last he should not dwell, as he did not recommend its employment. Punishment supplied an additional motive—fear. Of this, however, the operation was both limited and transitory, neither did it seem capable of strengthening any one of the other motives; rather the contrary, knowledge and employment being made distasteful by unpleasant association, the desire to please weakened, nay, often destroyed, by the feelings engendered by severity, and the sense of duty superseded and overpowered by fear. Before resorting to punishment, therefore, in aid of higher motives, all other means should be exhausted. Idleness was often caused by want of ventilation, unsuitable temperature, lack of space, mal-arrangement of a class, or external distractions, and all these should be rectified.

Again, the industry of the pupils would materially depend upon punctuality, earnestness, and temper in the master; the demand for attention must be kept within reasonable limits; the hours of occupation moderate, and varied to individuals according to their respective powers, which in any large number would be found to differ widely. The modes of instruction should also be duly considered. Was the memory called upon for an undue share of exercise? Was care taken to engage the mind with distinct and vivid conceptions, or was the lesson a mere repetition or exchange of words? Was the pupil ever called upon to prepare his tasks without a teacher at hand to give that aid which no rules or notes, however carefully and elaborately constructed, could supply? Further, were the subjects selected and arranged with due reference to the various powers and tastes of the

respective pupils, or were all alike constrained to follow a fixed course irrespective of idiosyncracy? Lastly, Did the pupil come to his lessons in a good state for their performance? Had he during his hours of retirement been duly provided with rest, air, and exercise? Until due attention had been paid to all these points, resort to punishment for the enforcement of industry should not be regarded as a necessity.

To turn from industry to respect, much that had been said of the one would apply to the other. Here, however, the teacher had to be more particularly on his guard, as the offence to be visited was against himself, and he was consequently in great danger of acting from resentment when he supposed himself to be impelled by a sense of duty. It was of the utmost importance that he should not be brought into contest with his pupils, that he should recognise and maintain the true dignity of his position, himself the moral physician, the pupils his patients, whose manifestations of anger, sullenness, or presumption, were to be treated as disorders to be cured, not as wrongs to be avenged. Again, he must lead his pupils to respect the rights of others by respecting theirs. Unless he abstained from rash blows, from sarcasm, and invective, he could scarcely expect a corresponding abstinence in his pupils; but if he so conducted himself towards them as to win their esteem and affection, he might feel sure that instances of disrespect, particularly premeditated or persistent disrespect, would be rare; and when any of these occurred, calm remonstrance in private would almost always be found efficacious, and, should this fail, a temporary separation of the offender from his companions, which might be necessary to prevent the effects of bad example was the severest remedy which he would venture to recommend.

In fine, he was of opinion that where the means which he had indicated for the promotion of industry and respect were made full use of, artificial punishment might be safely and advantageously laid aside.

The lecturer regretted that as he had now occupied the full time allotted to him, he could not proceed to the consideration of punishment as applied to breaches of the moral law.

Wednesday, August 16th, at 3 p.m.

On the Necessity of an Extended Education for the Educator. By the Rev. G. E. L. Cotton, Master of Marlborough College.

The early part of the lecture was occupied by a statement of the change which had taken place in the arguments of those who viewed the general education of the people with suspicion and distrust. Formerly the education of the poor had been opposed altogether, as unnecessary for men who were to be engaged in manual occupations. But the increase of crime and misery has made these arguments impracticable, and all are now forced to admit the necessity of education. The danger now is lest education should be limited to instruction in material things, lest industrial education, and such teaching as will enable the poor to make their homes comfortable and to increase the means of subsistence, should altogether take the place of a higher education, the training and cultivation of the mind, without reference to any considerations of practice and immediate utility. It was shown that such a training is the right and duty of all men, so far as they are capable of receiving it; it was hoped that it might be extended more and more widely. Common arguments against it, from its tendency to foster conceit, to unfit men for their position in life, to overthrow the present constitution of society, were noticed and answered, partly by counter-arguments, partly by examples. The instance of the Athenians was dwelt upon, and in the course of this part of the lecture, satisfaction was expressed in the fact that so large a portion of the Palace at Sydenham is devoted, not to the results of scientific and material ability, but to matters of historical and artistic interest. It was then urged that if our aim is thus to raise up in England a really educated people, it becomes absolutely necessary to widen the education of the educator. Various reasons were given to show the importance of having teachers who should be not only accurately, but widely taught. The principal of these were—1. The necessity of a teacher illustrating and expanding his lessons, so as to make them more lively and impressive, instead of confining himself to his book; 2. The importance of the pupils feeling that they are dealing with a man in all ways superior to themselves; 3. The constant occurence, in the midst of a number of ignorant and dull pupils, of one or two really able and promising, who are worth any amount of trouble; 4. The necessity of having a really wise and educated man to form and mould the character of the pupil. Schoolmasters were then urged not to content themselves with the teaching which they had received in training colleges, but to continue their own education by diligent private study. The greatness of their work was dwelt upon, and the lecturer noticed the mistake of those students in training colleges connected with the church, who were discontented with the office to which they were called, and aspired to become clergymen. In conclusion, although religious considerations were excluded from the lecture, yet the connexion of the mind and the spirit was briefly noticed, and while on the one hand it was argued that intellectual education would be useless without religion, yet religion itself degenerated into fanaticism and error, unless it was supported by education.

Thursday August 17, at 3 p.m.

On Familiar Methods of Instruction in Science. By Robert Hunt, F.R.S.

The lecturer commenced by saying that he believed we were making many very important mistakes in our attempts to introduce science into our schools. In endeavouring to point out those mistakes, he especially desired to be correctly understood, that he did not for one moment wish to undervalue the collections of scientific apparatus which had been contributed to the Educational Exhibition. Much of it was excellent, and a great deal of it exceedingly ingenious and simple. He wished to impress upon his listeners the importance of separating the striking phenomena of experimental science from the theoretical explanations by which they were usually accompanied. The young could receive the one—the infant mind even would retain the memory of a striking result—but it could not appreciate the other. Any child would be struck with the fact that a piece of sealing wax rubbed attracted light bodies, but that child must indeed have a man's mind who could understand any one of the views by which electrical attraction and repulsion are explained. The lecturer therefore contended that if it is important that science should be taught in our schools—the immature minds of children should be kept entirely free from the theories by which we attempt to explain scientific truths, and the attention of the child directed to the facts, the phenomena, alone. By this system the lecturer believed we should awaken the curiosity of the child; and if the child could repeat to other children the experiments he had witnessed, it would be a source of considerable pleasure, and the result, he believed, would be the awakening and the enlargement of the powers of observation.

In illustration of his meaning the lecturer started with the fact, for example, that air is necessary to support combustion,—and illustrated this by burning a taper in a vessel of air confined over water, simply explaining that something has been removed from the air which was necessary to the support of the flame. Numerous illustrations of other branches of science were given, for the purpose of showing that a certain number of most striking facts,—illustrating the conditions of cohesion; some of the remarkable laws of motion; the phenomena of fluid pressure; and even the operations of the physical forces—

electricity, light, and heat—could be sufficiently illustrated to interest a child, and that, too, in such a way that a child could repeat the illustrations as an amusement for winter evenings.

It may be said, and said very truly, that this was not teaching science, and that it was desirable, it may be added, to teach the inductive sciences early in life. The lecturer said he felt that not only was it in vain to endeavour to teach the child science, in the strict meaning of the term, but that the attempts to teach the adult public science had failed. All that we should endeavour to do, as he conceived, was to seize upon that peculiarly active principle in the minds of children—curiosity—and endeavour to gratify it, leading the mind at the same time to the careful observation of facts, training the intellect to examine between effects, and to advance by degrees to an examination of causes.

It were idle to attempt by one effort to awaken into full play the powers of observation and those high intellectual faculties by which we advance from pure induction to processes of deduction. Whenever we have attempted to teach too much, the result has been that we have taught nothing, except the worst possible of systems—a system of hypothetical reasoning of the most fallacious kind, or a system of reasoning by analogy, far too prevalent at the present time, by which the truth has become clouded, and error not unfrequently made to assume the semblance of truth.

The natural bent of the human mind is towards the investigation of natural phenomena. The child delights in the beautiful and curious phenomena of nature; train him, therefore, to observe not idly, but closely and correctly; and instead of teaching the young that costly apparatus are required to aid them in their progress, teach them the simplest means by which great truths can be seen, and trust to their inventive powers to devise other material aids to knowledge.

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FIRE-ARMS AND PROJECTILES.

BY LADY BENTHAM.

July 20, 1864.

The article respecting Fire-arms and Projectiles which appeared in the Journal of the Society of Arts of the 14th inst., induces me to say that the late Sir Samuel Bentham, having the improvement of our naval armament much at heart, failed not to exert his utmost endeavours in calling attention to the subject. It is a matter with which I cannot myself be acquainted, but I may be permitted perhaps, to observe, that he so far succeeded as to have induced the employment of artillery of large calibre instead of small, and the introduction of *shells* in naval warfare; and that in his several publications he has pointed out many of the still remaining desiderata in regard to weapons of war, whether great guns, small fire-arms, or cutting instruments.

Sir Samuel's publications are out of print, and of the "Naval Essay" only four incomplete copies are known to exist; therefore a short abstract of so much as relates to arms may not be useless. In that Essay he observes, that since the introduction of gunpowder, missiles projected by explosion are the chief means of annoyance to the enemy, and that, therefore, the shot, being the immediate instrument of destruction, stands first in the order of subserviency to warlike purposes; next the powder; then the gun, or other exploding implement; then the carriage; and lastly the means of transporting weapons of war from place to place.

In following this order of subserviency, he says that the destructive effects of the missile should be considered under different heads; as, for example, percussion, penetration, conflagration, subsequent explosion. "The effect in regard to simple percussion, penetration, and laceration, will depend on the form of the shot, on its bulk, its hardness, its specific gravity, and on the momentum with which it strikes the object. The momentum will not only depend on the degree of impulse originally given to the shot, or as it is continued afterwards, as in the instance of rockets; and in all cases materially as the form of the shot is more or less suited to overcome the resistance of the air. The direction of its flight in the direction given to it will depend upon the situation of its centre of gravity, and on its form as giving rise to modifications occasioned by the resistance of the air, and by gravitation. Conflagration may be made to take place either by previously heating the missile, or by subsequent inflammation of its materials. The efficacy of gunpowder will depend on its sudden chemical decomposition, or on a more gradual decomposition, as in rockets; or on its communicating fire to other inflammable substances, as in fireballs. The *continuance* of fitness for use of gunpowder depends on its liability to decomposition, and on the means adopted to preserve it from either gradual or sudden destruction. The efficacy of the gun depends upon its power of resisting the force of explosion—as the tenacity of the material of which it is made—on its thickness; on its length, as affording sufficient space for the decomposition of the whole charge of powder before the missile quits the piece; on the ignition of the powder at the instant of taking aim; and on the power of the material to bear being heated without explosion or deterioration. The efficacy of the carriage depends on its power of resisting the counter-effect of the impulse given when a shot is propelled; on the facility of loading the gun; of pointing it; of moving the gun (if it be necessary to move it) for loading; on the facility of moving both gun and carriage from place to place. "The efficiency of this destructive apparatus, as a whole, will depend not only on the destructiveness of each shot which it is adapted to propel, but will likewise be in direct proportion to the *number* of such shot which can be propelled with good effect in a given time; and in an inverse proportion to the number of men, and the degree of their exertion required for putting the whole of this apparatus to its use."

Subsequent pages relate mainly to the advantage consequent on the shallow draught of water of vessels of war; and that, whether for the defence of our own shores, or for the annoyance of an enemy on his coasts, or in his rivers.

It appeared in evidence before the recent Committee of the House of Commons on Small Arms, that their per-

fection for *naval* purposes is thought to be but of inferior importance, and that, therefore, such as are discontinued in the land service are still furnished to vessels of war. Sir Samuel was of a widely different opinion. He says that, "Although naval force is generally considered as consisting of vessels and ships armed only with what are called great guns, yet, in point of fact, portable arms are also provided, and have on many occasions been used with great advantage at the same time with great guns; and even when our ships have been attacked under circumstances which did not admit of making much, if any, use of great guns, the enemy has been overcome though the combat has been carried on chiefly by means of the portable arms combatants have been furnished with. "A ship, though armed with a hundred guns, if aground, or in certain states of the weather, * * * may be incapable of throwing shot from the great guns so as to reach an enemy in certain directions." * * * It is principally from such implements" (portable arms) "that success is looked for on the frequent occasions of boarding an enemy's vessels, or resisting his attempts to board our own." He observed that small arms "(like the great guns used for naval warfare) were originally the same as for land service," and therefore inquiry would probably show that no attempt has been made to adapt them to the peculiar circumstances of naval warfare; and in regard to them the principal subjects of enquiry are the *comparative* advantage of portable firearms of different degrees of portability? Of those which, like pistols, are so little cumbersome as to be carried about the person of the combatant, leaving his hands free; of others which, though portable, yet do not leave the hands at liberty. "What are the arms in use which, though of a weight capable of being moved by the muscular force of a single man, require some support in action, especially for taking aim, and against recoil * * * whether, although portability be a very essential consideration in regard to instruments of destruction on boarding an enemy's vessel, some kind of arm may not be found much more destructive than the small arms in use, but yet sufficiently moveable to be well suited to defence against an enemy's boarding." It may be here observed that a field is thus opened for inventions that may prove of great importance.

As to cutting weapons the General states that "The destructiveness of an implement for cutting will depend on the shape and the form of its edge; on the position of its centre of gravity; on the commodiousness of the handle; and on its weight being suited to the muscular strength and the dexterity of each individual combatant."

"The continuance of a state fit for use of such implements will depend on the quantity and quality of the materials of which it is composed (suppose steel) being adequate to afford sufficient strength of the whole against breakings, and of the edge against chippings, or blunting, whatever be the substances it has to encounter; not only in wounding the enemy, but in clearing away the obstacles afforded by different articles of cordage, wood, or sometimes even of metal." Investigation would, therefore, be directed to the form given to cutting instruments, and to those for piercing—Are the edges made straight or curved; in a convex or a concave line; can the material at the same time take the sharpest edge, and resist injury the best; are the weight and size of such arms varied with a view to their appropriation to men of different degrees of strength," &c.

It would seem that as small-arms, bayonets, &c., are required to be made one and all according to the same pattern, that both in the land and sea service there is still no discrimination made as to the strength of individuals, but that all are furnished with arms of the same size and weights.

It may be noticed that one copy of the first part of Sir Samuel's "Naval Essay" may be found in the Library of the Society of Arts, and might be worthy the perusal of persons desirous of improving arms and naval armaments.

Although the General deprecated *partial* experiments, such as whether this or that form of gun was the better of the two, he contended that certain facts could no otherwise be ascertained than by experiment—experiment as nearly exhaustive as possible. He noted many of those that appeared to him desirable; amongst others a few relative to fire-arms; they were solely for his own use, but having been found amongst his papers they were published in two successive numbers of the "Mechanics' Magazine," being those for June 8 and 15, 1850.

ARTIFICIAL BREEDING OF FISH.

A paper has lately been read before the French Academy, by M. Millet, on the natural and artificial hatching of fish-spawn. M. Millet says, "in all the operations connected with the rearing of fish, in order to attain success, much attention must be paid to the teachings of nature. It is by conforming to these principles, after studying for many years the habits and manners of fish, that I have sought to ascertain the best means of stocking the waters with this valuable description of food. For five successive years, from 1848 to 1854, I have made and caused to be made a variety of experiments in relation to artificial spawning applied to the breeding of fish. At the same time, I have endeavoured to ascertain if it were possible to obtain results sufficiently satisfactory by following closer and closer the natural conditions of the spawning, so as to render the operations more simple, more economical, and more certain. I have since renewed my experiments on natural spawning, and have compared the results with those of the artificial method.

Among the different species of fish we may divide them into those which spawn in quick running streams, and those which spawn in still waters. In the first category will be found salmon, trout, grayling, &c.; in the second, carp, tench, &c. The trout makes an actual nest at the time of depositing her roe; she looks out for a bed of large gravel or flint stones washed by running waters; these she turns over, and cleanses from all matter adhering to them, and foreign substances deposited by the water. She then hollows out cavities among the stones, into which she deposits the roe, so placing herself as for the current to carry it into the places prepared for its reception. While this process is going on, the roe is impregnated from time to time by the discharge of milt from the male, who hovers near. The female then covers up her nest with the stones which had been previously removed. Spawning beds may be established in water-courses. If the bed of the river is furnished with large gravel, or flint stones, these materials may be at once made use of for the purpose. It is only necessary to turn them over with a shovel or a rake, to form them into heaps, mounds, and small cavities. There is no difficulty in forming these spawning-beds, and the expense is trifling. When the bottom does not naturally afford the proper material, gravel, flint-stones, or pieces of rock, must be supplied. The formation of these artificial spawning beds, among other advantages, is attended with this, that the trout are retained in the stream thus stocked. Their efficacy is such, that I have caused trout to spawn in holes and old ditches where I have thrown, before the regular time for spawning, several barrowfuls of stone broken for mending the roads.

The grayling spawns frequently at a considerable depth. I have caused many cubic yards of rock and stone to be thrown into ditches, from ten to twelve yards in depth, and these have served as spawning beds for grayling.

For barbel, gudgeon, &c., I make in shallow running streams a sandy bottom, with a slight declivity, with heaps of small stones and washed gravel, taking care to turn over and clean the materials with a shovel or rake.

The miller's thumb, the bullhead, and the minnow, breed readily in the same waters as the trout, more especially in springs and brooks. The fry of the miller's thumb and the bullhead are hatched at a time when the

young salmon, trout, and grayling are sufficiently advanced to feed on very small tender fish.

The miller's thumb looks out for stones under which cavities are found, in which she glues or sticks her eggs. But there is in this instance a previous proceeding, which consists in taking possession of a place, and *making the nest.* This fish hollows out a gallery or tunnel, with an entrance and an exit. The female glides under the stone, and then turning on her back rubs her belly forcibly against the face of the stone, depositing a portion of her roe, which immediately adheres. The male then follows into the nest, and by a similar movement to that of the female, while turning on his back, impregnates the eggs which are just laid. The miller's thumb keeps watch over her nest, and keeps at the entrance of the tunnel to drive away all injurious animals.

For carp, bream, tench, &c., the spawning beds are formed in still fresh water, which are kept by the sun's rays at a moderate temperature. The carp more particularly spawns most abundantly in ponds where the water is perfectly stagnant. Moveable spawning beds may be formed by means of faggots or hurdles placed near the edges as inclined planes, covered with pieces of turf or rushes.

The perch spawns in a manner altogether peculiar. Its eggs are fixed to each other in small groups forming a broad ribbon, which has the appearance of beautiful lace-work. This fish has but one ovary, which is completely emptied at one time. In a large number of ponds and lakes the perch roe is hatched by means of faggots thrown into the water. At spawning time the perch quits the running waters, and seeks still pools. In preparing the spawning beds for this fish, masses of rushes or grass, faggots or branches, are thrown into the water; or, what is better still, boughs of trees with small branches attached (such as willow boughs) are stuck into the banks at a depth of from half-a-yard to a yard. It is very easy to gather the spawn, for all that is necessary is to raise the ribbons with a stick or a small fork.

Artificial spawning-beds, applied to the hatching of certain *cyprinidæ*, particularly of the bream and the roach, and of the perch, have been employed as a means of stocking waters in very many places. Since the year 1761, Lund obtained successful results by this means; he produced upwards of ten millions of young fish.

Home Correspondence.

THE BOOKS EXHIBITED AT ST. MARTIN'S HALL.

(SECOND ARTICLE.)

BOOKS FOR THE EDUCATOR IN FOREIGN LANGUAGES.

SIR,—On the continent of Europe, amongst the most enlightened nations (or rather *peoples*, as the Germans cannot be viewed as one nation), the education of the people exhibits features quite distinct from those of public education in this country, and differing considerably also from what we find in the United States of America. In Britain such education as the people receive is supplied to them mainly on the voluntary system, the government doing nothing but assisting a little the spontaneous efforts of the friends of education. Amongst our transatlantic brethren the general government takes little or no part in the work of education; each state of the Union is sovereign and independent in respect to the education of its own citizens; and, although the legislature of each state does take up more or less the business of public education, still the general results are very different from what they would be were the whole efforts of the central government directed to the question. On the other hand, in France, Prussia, most other German States, in Belgium, and in Holland, the work of educating the people is viewed as the business of the general government, which assigns the carrying out this great object to a distinct department, acting with the force and authority of the supreme government, enlisting in its service the highest learning and ability, with a numerous staff, extensive machinery, and ample means for carrying out the most efficient arrangements that can be devised for the great work. In these countries, too, this system has been sufficiently long established to have called into existence an educational literature of vast extent and variety, commensurate with the magnitude of the educational operations carried on. In nothing do we observe the results of this concentration on educational questions of the talent and force which government can call out than in the educational literature of France, Germany, and Holland, on the one hand, compared with that of Britain or the United States on the other. The complete, systematic, and thorough character of the former, with its adaptation to every variety of want—forms a striking contrast with the half-formed, irregular, fragmentary character of the latter. This is particularly the case with the books for the educator under the two systems; and, as illustrating what we conceive to be the results—partly direct—partly indirect—of the stimulus given to educational literature by a truly national system of education, we select from the catalogue of one publisher in Paris the heads or leading divisions of his books for the educator. We refer to L. Hachette et Cie., Rue Pierre-Sarrazin:—"Enseignement Domestique;" "Enseignement dans les Salles d'Asile, pour l'Enfance;" "Enseignement Primaire"—1. "Méthodes d'Enseignement," "Pedagogie," "Statistique et Législation de l'Enseignment Primaire," 2. "Manuels à l'Usage des Aspirants et Aspirantes, aux Brevets de Capacité pour l'Enseignement Primaire, Elémentaire, et l'Enseignement Primaire Supérieur." "Enseignement Secondaire et Enseignement Supérieur," 1. "Législation, Statistique, Pédagogie;" 2. "Programmes et Manuels pour Divers Examens." In each of these divisions and sub-divisions there are numerous works; and there are several other publishers of books on Education, as Dezobry et E. Magdeleine, Langlois et Leclercq, Didier, and Veuve Maire-Nyon; though certainly Hachette is the principal educational publisher.*

Upon the laws relating to public education, the following are the leading works: "Legislation de l'Instruction Publique," par M. Barrau, 5 fr. 50 cent.; and by the same author, "Instructions sur la Nouvelle Loi d'Enseignement," 1 fr. 25 cent., and "Loi sur l'Enseignement" (nouvelle) 60 cent. Also "Code Universitaire," 15 fr., and "Almanach de l'Université de France," 5 fr. There are many valuable works on Pedagogy; the principal of these are "Cours Normal des Instituteurs Primaires," par M. De Gérando;" "Cours Normal des Institutrices Primaires," par Mlle. Sauvan; "Conférences sur les Devoirs des Instituteurs Primaires," par M. Salmon, 3 fr.; "De l'Education Populaire," par M. Prosper Dumont, 5 fr.; Lettres sur la Profession d' Instituteur," par M. Théry;" "Cours de Pédagogie," par M. Ambroise Rendu, Fils," 1 fr. 40 c.; "Cours Pratique de Pédagogie," par M. Daligualt;" "Leçons de Pédagogie," par J. F. A. Dumouchel; "Guide des Instituteurs," par J. B. Forneron;" "Le bon Instituteur," par M. l'Abbé Collard;" "Direction Morale pour les Instituteurs," par M. H. Barrau, 1 fr. 25 c.; "De l'Education dans la Famille et au College," par M. Barrau, 5 fr.; "l'Instituteur Primaire," par M. Matter, 3 fr.; "Le Visiteur des Ecoles," par M. Matter, 2 fr.; "Manuel complet de l'Enseignement Mutuel," par MM. Lamotte et Lorain, 2 fr.; "Manuel complet de l'Enseignement Simultané," par MM. Lamotte et Lorain, 2 fr.; "De l'Enseignement regulier de la Langue Maternelle," par Gregoire Girard, 2fr. 25c. The following works are chiefly on Home Education: "Premiers Conseils aux Mères," 2 fr. 50 c.; "Conseils aux Mères, sur les Moyens de diriger et

* We should recommend Hachette's catalogue of books, and his catalogue of *materiel*, to the notice of all interested in education. Many of his books, and a good many specimens of his *materiel*, are in the Exhibition.

d'instruire leurs Filles, à l'usage des Mères, des Institutrices, et des Maitresses de Pensions," 7 fr. 50 c., and "Conseils aux Jeunes Personnes, sur les Moyens de Completer leur Education," 9 fr., all by M. Thery. "De l'Education des Filles," par Fenelon, 60 c.; "Lettres de Famille sur l'Education," par Mme. Guizot, 6 fr.; "Education des Femmes," par Mlle. de Lajolais, 3 fr.

In examining the French works on pedagogy, two things are at once apparent—first, the number and variety of them, next the full, systematic, and minute treatment of the subject—both circumstances uniting in showing that in France the principle is fully established, that the teacher must have a manual of the principles and practice of his art, just as much as a pupil about to learn geography or history must have a text-book to study on the subject. In conformity with the genius for organization and arrangement which distinguishes the French character, we find the subject subdivided minutely, and its parts classified, so as to treat it progressively, and bring out each point distinctly and prominently. All this is good, and useful to the young teacher; but when we examine these works closely, it does not appear to us that they descend into the depths of the subject, sift its principles, or work out the details in a manner calculated to be of very material service to their readers. The arrangement is excellent; such principles as are developed are given with that point and happy expression which enables French writers to say so much in a few words: but, we seek in vain for any solution, or even discussion or mention, of numerous educational questions of the greatest interest and importance, which one would expect to be noticed at least in a work on pedagogy. The principles of teaching, as relating to the intellectual nature of the child, or the varied characters of the subjects, are hardly touched upon; we hear only of instruction, little or nothing of the development of the observing, reasoning, inventive faculties. Nor do we find these omissions supplied by other works, treating of the mode of teaching special subjects. Altogether, from an examination of the most recent French works on pedagogy, it appears to us, that the movement of the government has advanced education in France, in its externals—all material means and appliances—beyond the stage that the development of the philosophy of education has reached; a circumstance quite likely to have occurred where the force of a powerful government has been applied suddenly and with energy to the subject. We think we can trace also, in the remarks of MM. Barrau, Thery, and Dumouchel, cautioning the teachers of the primary schools in rural districts to adhere to the books and methods laid out by the authorities—indications of too much governing—of a too minute superintendence; and a cramping of the teacher's energies by confining him in everything to prescribed channels. To those who wish the most elaborate French works on pedagogy, we should recommend those above cited, "Cours Normal des Instituteurs Primaires," par De Gerando; and "Lettres sur la Profession d'Instituteur," par A. Théry. Those who desire merely a sample of the most recent French ideas on the subject, will find such in the lighter works (also cited above) of Ambroise Rendu, Daligault, Dumouchel, or the little manual of Forneron.

It would appear that the system brought forward by Le Père Girard, of Fribourg, is rather gaining ground in France. A laudable effort was made some years since, by Lord Ebrington, to make us acquainted with Girard's principles, by an English translation of his volume mentioned above, which, though its title indicates a work on the teaching of the mother tongue, is, in reality, a treatise on general education, as Girard makes the mother tongue the basis on which all is to be founded. M. Théry, scouting Jacotot, and apparently not estimating so highly as others do the efforts of Pestalozzi and Fellenberg, speaks of Girard as the man who has done most in recent times for the education of children. Prosper Dumont and Ambroise Rendu, in the works above referred to, pass warm eulogiums on the methods of Girard, which have also obtained the approval of the high authority of Villemain; whose praises, however, were awarded before the works exhibiting the details of the system were published. "The true, the only school for the children of the people," says Villemain, referring to Girard's system, "is that where all the elements of study contribute to the elevation of the soul, and where the child is improved by the things it learns, and the way in which it learns them." The principal feature in this system is by means of systematic training in the mother tongue, to develop both the intellectual and moral character of the child. It rests upon the principle that man acts according to his feelings, and feels according to what he thinks and knows. Through the analysis of language Girard desires to develop thought, and through thought feelings and actions. "Les mots pour les pensées; les pensées pour le cœur et la vie." In his system, "by the aid of the verb and its different conjugations, the child learns to construe at first simple propositions, then compound propositions, next sentences of two propositions, sentences formed by a process of reasoning, and, finally, sentences of comparison. That is to say, by the process of Le Pére Girard, the child, setting out from the simple enunciation, "I am speaking," reaches the composition, grammatically and logically, of the most complex sentences. But, during the whole course, it is subjected to a moral discipline, which never ceases to go hand-in-hand with the grammatical and logical exercises. Thus, from the time that the child knows how, by the aid of the verbs of the first conjugation, to enunciate the most simple proposition, others are presented to him, such, for example, as the two following—

The Christian imitates Jesus Christ.
The brother maltreated his sister.

Then, the learner is told—find the verb, the subject, the object; spell each word, and give its gender, number, tense, person; judge if it is a good or bad action, and why. That is to say, all the mental operations to which this proposition can give rise are presented to the child, and thus, not only is the memory exercised, as is usual in the teaching of grammar, but also the intellect and the moral sense. When a child that has studied grammar for a fortnight is brought to find, by itself, the object and subject; when it states why one word is the object and another the subject; when it is exercised in judging if such an action be good or bad, and why it is good or bad, we may be certain that if its intelligence is highly developed, at least the unity of its being is not destroyed, and that a just equilibrium is preserved in the development of its faculties." Such is the principal part of the account of Girard's method given by Prosper Dumont (work cited above, p. 307). It is impossible, in so brief a sketch, to convey any adequate idea of a whole system. For further details we must refer to Dumont's work—to Girard's work, referred to above—and especially to his "Cours Educatif de Langue Maternelle," in three parts, 4fr. 50c. each, in which his plans are developed at length. Doubting, with Dumouchel (work above mentioned, p. 154), the efficacy of "un principe de morale enchevêtré dans une règle de grammaire," we still believe that in teaching the mother tongue, and in employing thorough and systematic teaching of it, as a means of mental training, valuable hints may be derived from the works of Pere Girard, and that more frequent discussions between teacher and pupil on the principles of morals, and of the character of various actions, with the reasons, would have an excellent moral effect. The works of Girard are to be found in the Exhibition, in both the French and Swiss departments.

Amongst the French works on education the following are worthy of notice—"Manuel des Salles d'Asile," par F. D. M. Cochin, 5fr.; "Guide des Salles d'Asile," par M. J. de la Perelle, 2fr. 50c.; "Enseignement Pratique dans les Salles d'Asile," par Mme. Pape Carpantier, 5fr.; "Conseils sur la Direction des Salles d'Asile," par Mme. Pape Carpantier, 1fr. 50c. For the home education of

girls we find an extraordinary work, which has no parallel, that we know of, in English—"Cours Complet d'Education pour les Filles;" Education Elémentaire, 10fr., Education Moyenne, 63fr., Education Superieure, 48fr. Each of these divisions consists of a treatise on education by M. Théry, and a full body of the subject matters to be taught; so that the parent has the whole of her work before her—what to teach, how to teach it, and how to train her young charge. The volume on elementary education is designed for those from four to ten years of age, the middle course from ten to sixteen years, the advanced course from sixteen to twenty years. Each of the preliminary works and of the treatises is sold separately. An inspection of these works will explain more of their nature than we could say in several pages. They are in large octavo, and will amply repay an examination. The names of M. Théry's treatises are given above. Of French works for the educator we have now only the *manuels* to refer to, and very few of the German works have arrived yet, so that we shall be able to begin with the books for the scholar in the next article.

Yours, &c.,
A MEMBER.

SCHOOL FEES.

SIR,—I trust that the important discussion upon "School Fees," recorded in your Journal of yesterday, will be rediscussed by every school committee in the country.

I have long entertained the opinion that parents commit a serious error in supposing that it is the DUTY of a committee to educate their children for a 1d. or 2d. per week, when such parents are in receipt of excellent wages, and can ably afford a higher rate. It is the parents and their children who will reap the DIRECT benefit, and not the committee. It is the parents' duty, even although it involve sacrifices, to see that their children receive such an education as will fit them for whatever sphere in life they may be called upon to occupy.

I cannot think it right for tradesmen and respectable artizans only to pay 1d. or even 4d. per week for the education of their children, an education which in numerous instances eclipses, in general utility, that which is received in many private seminaries and boarding school academies at a considerably higher price. Those days are happily gone for ever, when the aged school dame replied "They pays us little and we gives 'em little."

When we consider the improved condition of the industrial classes of this country, compared with what it was in the days of Bell and Lancaster, I cannot think that there is the same necessity for the penny school as formerly. I admit there are persons so poor that a penny is the extent of their means, but in a large proportion of our public schools, excepting those in low neighbourhoods, the majority of the pupils are the children of tradespeople and respectable artizans.

I would suggest that all schools for the class of children last mentioned should not have the recognised standard of school pence *less* than 6d. per week, with the proviso to lower the terms to meet particular cases, as their real necessities might require. Such a plan, assisted by a slight voluntary aid, would enable a committee to offer a teacher a respectable salary, besides causing those to pay who could well afford it; and parents *paying* for the education of their children, would value it more, and look better after their attendance and improvement. Suppose a school to commence on this principle, and the number of children in attendance to average *only one hundred*, the committee guaranteeing the teacher 90*l*. per annum, what would be the financial effect of such an arrangement?

Averaging each child to the committee at 5d., on account of reductions in certain cases, there would remain in the hands of the treasurer, after deducting the teacher's salary, a balance of 18*l*. 6s. 8d.

Such an arrangement would make the school more efficient, by enabling a master to purchase not only the works on mathematical and philosophical science, but also the necessary apparatus for the purpose of illustrating the lessons given in the school. A teacher cannot be benefitted without his pupils necessarily receiving a share of it, and his resources cannot be crippled, without at the same time deteriorating, to some extent, the value of the education imparted.

Had such a plan, that I have merely glanced at, been more generally adopted in our monitorial schools at an earlier period, it would have disarmed one of the most potent arguments in favour of government aid, viz.,—That the voluntary efforts of this country are not sufficiently extensive to educate the masses of our industrial population. Under this plan many schools would have been self-supporting; and instead of them, like meteors, going out in obscure darkness, they would now have been diffusing around them their intellectual rays, a blessing to their locality and a benefit to the country.

I am Sir,
Your obedient servant,
JOHN HILL.

Educational Institution, Bootle, August 12th, 1854.

LIST OF LECTURERS.

Wellingborough, August 16, 1854.

SIR,—I do not agree with Mr. Dalgleish in his observations on your Lecture List; we have had gratuitous lecturers equal to paid ones. The list is a valuable means of making known lecturers whether paid or not, who would otherwise, for the most part, be unknown. Some of the paid lecturers take too great a variety of subjects; and, when applied to to give a lecture on some subject in their list, either wonder that you should have chosen such a subject, or politely request you to change it: thus, lecturers having only one subject, although not strictly professional lecturers, give most satisfaction. In small towns like our own, some difficulty is experienced in raising funds for a supply of competent lecturers; and, our object in placing ourselves in connection with the Society of Arts having been, principally, a hope that some arrangement might be made whereby good lecturers would be induced to give their services at a moderate professional remuneration, we think the subject should not be lost sight of. At the same time, it must be admitted that considerable difficulties will ever exist in making such arrangements; many of the best recommended lecturers on the list being liable to objections on various grounds; and the societies will generally be better pleased in selecting their own lecturers than in submitting to Mr. Dalgleish's plan of delegation.

If not foreign to the subject, may I, in conclusion, be allowed to inform Mr. Cobden, through your Journal, that we have, in our society, what he has sought for in vain in Mechanics' Institutes, one or two of those "rare birds" agricultural labourers.

I am, Sir,
Yours respectfully,
EDWARD SHARMAN,
Hon. Sec. of the Wellingborough Parochial Library, and Lecture Society.

THE OIL OF THE CAHOUN OR PALM-TREE OF BRITISH HONDURAS.

Sir,—I am now in a position to report upon the bottle of Cahoun oil with which you favoured us.

In its melting point crystals, action in saponification, general character, useful properties, and value, it is identical with the fine cocoa nut oil of the Malabar coast.

The price in this market of fine Cochin cocoa nut oil has ranged within the last ten years from below £30 to above £60 a ton; its value in future, excluding Russian war time on the one hand, and times of very extraordinary depression on the other, and making some allowance for the actual and probable effect of the soap excise removal, may probably be taken at between £35 and £40 a ton.

In judging the value of new oils allowance should be made for the description of package they come over in. Oil out of a well-corked specimen bottle always appears more valuable than the same description of oil proves to be when imported in quantity in casks.

Sir Wm. Hooker has favoured us with the information that the botanic name of the Cahoun palm is Attaba Calhune, very closely resembling, if not identical with, Attaba Compta, which is common to all the northern parts of South America,

I am, Sir, yours, &c.,
for Price's Patent Candle Co.,
GEORGE A. WILSON.
Managing Director.

Belmont Vauxhall, London, 8th August, 1854.

MEETINGS FOR THE ENSUING WEEK.

MON. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Cardinal Wiseman, "On the Home Education of the Poor.", No. 2.
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Professor Hunt, "On Classes for Scientific Observation in Mechanics' Institutes."

TUES. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Mr. Curwen, "On the Tonic Sol Fa Method of Teaching Singing—illustrated."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Rev. W. W. Cazalet, "On the History of Musical Notation."

WED. Society of Arts Educational Exhibition, St. Martin's Hall, 3.—Mr. Yeats, "On Public Instruction in Holland and Switzerland."

FRID. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Mr. W. B. Adams, "On the Paths of Physical Progress."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Dr. Hodgson, "On the Analysis of Sentences, simplified by Illustration."

SAT. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Rev. M. Mitchell, "On the Study of the Arts—Architecture, Painting, and Sculpture—as connected with non-Artistic Education."

PARLIAMENTARY REPORTS.

SESSIONAL PRINTED PAPERS.

Par. Numb.

Delivered on 5th August, 1854.

349. Emigrant Ships: Second Report from the Committee.
437. Surgeons, &c. (Baltic and Black Sea): Return.
409. Factories: Returns.
266. Bills: Valuation of Lands (Scotland) (Lords' Amendment).
267: Bills: Youthful Offenders (Lords' Amendments).
268: Bills: Spirits (Ireland) (Lords' Amendments).
269: Bills: Episcopal and Capitular Estates Management) (as amended in Committee, and on consideration of Bill as amended).
270. Bills: Customs.
Railways: Report from the Railway Department, Board of Trade.
Public General Acts; Caps. 38 to 59, inclusive.

Delivered on 7th August, 1854.

395. Caledonian Canal: 49th Report of the Commissioners.
314. Complaint (7th February): Report from the Committee, and Minutes of Evidence.
271. Bill: Customs Tariff Acts Consolidation.
Prisons in Ireland: Annual Report of the Inspector.

Delivered on 8th August, 1854.

385. Constabulary (Ireland): Abstract of Statement.
438. River Tyne: Copy of a Letter.
Charitable Donations and Bequests for Ireland: 9th Report of the Commissioners.
439. Army Prize Money: Account.
429. Sugar, &c.: Return.
272. Bill: Encumbered Estates (West Indies) (amended).

Delivered on 10th August, 1854.

426. Stamped Publications: Copies of Correspondence.
434. Printing (Houses of Parliament): Report from the Committee.
283. Book of Common Prayer: Copy of Alterations in 1689.
273. Bill: Legislative Council (Canada) (amended).
Post Office: Report.

Delivered on 11th August, 1854.

Public General Acts: Caps. 51 to 73.

Delivered on 12th August, 1854.

442. Census (1841 and 1851): Return.
Cholera (Newcastle-upon-Tyne, Gateshead, and Tynemouth): Report of Commissioners.
[illegible]: Railway Accidents: Reports (April and May).

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Aug.* 11*th*, 1854.]

Dated 22nd May, 1854.

1133. B. W. Fase, Charles street, Soho square—Brooch.

Dated 26th May, 1854.

1177. J. Lord, Farnworth—Ladies' under clothing.

Dated 29th May, 1854.

1189. W. Northen, Lambeth—Manger and troughs.

Dated 11th July, 1854.

1519. V. G. A. Cuvier, Seloncourt—Utilization of gaseous products for heating, &c.

Dated 13th July, 1854.

1543. J. B. Chauvet, fils, Aix—Anchor.

Dated 17th July, 1854.

1570. J. Fowler, jun., Bristol—Draining ploughs.

Dated 20th July, 1854.

1593. G. Jackson, Manchester—Tents.
1595. F. and W. Whitehead, Crayford—Safety lamps.
1597. W. Palliser, Comragh—Projectiles.

Dated 21st July, 1854.

1601. A. B. J. Jean, and A. A. Hugues, Paris—Reducing friction of bearings, &c.
1603. J. T. Moss, Arundel street—Roasting apparatus.
1605. J. Alexandre, Bruxelles, and A. Somerville, Birmingham—Boots and shoes.
1609. J. Sedgwick, Lewisham—Ship building.
1611. C. Harratt, 2, Royal Exchange buildings—Fastenings for ship building.

Dated 22nd July, 1854.

1613. J. Lamb, Newcastle-under-Lyme—Paper. (A communication.
1615. J. Hadden Young, 66, College street, Camden town—Gathering grain.
1617. J. Bainbridge, 36, Ely place—Fire grates, &c.
1619. J. Dilks, Nottingham—Application of textile fabrics to binding packets of lace, &c.

Dated 24th July, 1854.

1625. A. E. L. Bellford, 16, Castle street, Holborn—Kneading machines. (A communication.)

Dated 26th July, 1854.

1638. J. A. Cutting, Boston, U.S.—Photographic pictures on glass.
1640. A. Oppenheimer, Manchester—Mohair and worsted velvet or plush.
1642. A. E. L. Bellford, 16, Castle street, Holborn—Mill for grinding paint. (A communication.)
1644.—E. A. Pontifex, Shoe lane, and C. Glassford, Greenwich—Lead.
1646. P. A. Godefroy, 3, King's Mead cottages, Islington—Purifying coal naptha and turpentine.
1650. A. E. L. Bellford, 16, Castle street, Holborn—Soldering metals. (A communication.)

Dated 27th July, 1854.

1652. R. C. Burleigh, Northumberland street—Guns and projectiles.
1654. F. D. Molvé and P. Martin, Paris—Heating water for feeding boilers.
1656. W. Shorrocks, Farnworth—Presser flyers.
1658. B. H. Jenks, Bridesburgh, U.S.—Weaving fancy fabrics.
1660. N. Miller, Guide bridge, Lancaster—Railway crossings.

Dated 28th July, 1854.

1662. G. L. Scott, and S. Bennett, Manchester—Roller springs for mangles.
1666. F. Morton, Liverpool—Girders.
1668. S. Clift, Manchester—Paper, &c.

Dated 29th July, 1854.

1670. R. J. Keen, Liverpool—Mariner's compass.
1672. E. Burke, Upper Thames street, and A. S. Stocker, Poultry—Metallic tubes.
1674. W. H. Smith, Bloomsbury—Permanent way.
1676. J. Y. Borland, Manchester—Preparing and spinning machinery.
1678. G. H. Ingall, Warnford court—Elastic bands.
1682. G. Thatcher, Welton Midsomer Norton—New material for woven fabrics, &c.

Dated 31st July, 1854.

1684. H. Adams, New cross—Revolving ventilator.
1686. J. Green and W. Jackson, Leeds—Mortising machines.
1688. T. R. Bridson, Bolton-le-Moors—Preparing cotton.

Dated 1st August, 1854.

1690. J. F. Bouneau, Paris—Propelling ships.
1692. C. R. Read, Moorgate street—Slide valves. (A communication.)
1694. W. E. Newton, 66, Chancery lane—Repeating firearms. (A communication.)
1696. T. E. Merritt, Maidstone—Photography.

Dated 2nd August, 1854.

1698. J. Griffiths, Wickham Market—Lever bit for horses.
1700. G. H. Palmer, Hampstead—Guns, &c. (A communication.)
1702. J. Brown, Stockport—Consuming smoke.

WEEKLY LIST OF PATENTS SEALED.

Sealed August 12th, 1854.

361. Patrick O'Connor, Wavertree—Improved lever hinge for suspending and closing doors and gates.
371. Cromwell Fleetwood Varley, 1, Charles street, Somers town—New arrangement or apparatus for transmitting electric telegraph signals.
373. John Greenwood, Irwell Springs, near Bacup, and Robert Smith, Bacup—Improvements in sizeing, stiffening, and finishing textile materials or fabrics.

Journal of the Society of Arts.

FRIDAY, AUGUST 25, 1854.

Educational Exhibition.

A Deputation from the Council, consisting of Lord Ebrington, the chairman, and Mr. Harry Chester, V.P., accompanied by the Secretary, had an interview with Lord John Russell on the subject of the Government taking advantage of the present collection in St. Martin's Hall, for the purpose of establishing a permanent Museum of Education, and subsequently, on the request of the Chancellor of the Exchequer that the proposal of the Society should be put into writing, the following Memorandum was drawn up and communicated to the Government:—

The extent and general character of the collections now in the Exhibition at St. Martin's Hall, may be ascertained by the accompanying catalogue.

They have been got together by the Society of Arts, at a very heavy cost, and by very great exertions.

The Council has long been impressed with the conviction that, in order to maintain the Arts, Manufactures, and Commerce of the United Kingdom in a condition of progressive improvement, the education of all classes of the community must be improved; and it has been thought that, while the acerbity of religious differences continued to prevent the establishment of any general system of national education, a great improvement might be effected in the means and modes of instruction, and a considerable impetus might be given to an impoved public opinion on the subject of public education, by a general exhibition which should afford a comparison not only of the existing means and appliances of instruction, but also (as far as possible) of the results which they have produced in the United Kingdom and Colonies, as well as in foreign countries.

It was hoped also that for such an object the representatives of the different Associations for the promotion of public education in this country might be induced for the first time to unite; and that their union, even for this limited and specific object, might tend to remove prejudices, and to create a desire for a further and more lasting co-operation.

These expectations have been realized to a great extent. All parties have united to promote the success of the Exhibition; and its great utility has been affirmed by those most competent to judge of it.

Its defects, viz., a want of classification, and of the juxtaposition of analogous objects, are necessarily incidental to a temporary collection of multifarious articles, the property—not of the holders of the Exhibition—but of the several Governments, Boards, Associations, Schools, and Individuals, scholastic and commercial, who have exhibited the objects, and who would not consent to break up their collections into fragments, difficult to be identified, and impossible to be properly watched.

These defects, however, would have no place in a permanent national museum, where all would be the property of the public, and available for the best possible arrangement.

The Council has always had in view the very great importance of establishing, on a permanent footing, an Educational Museum, open without difficulty to the visits of all inquirers.

The principal Educational Societies have already their repositories for the exhibition of articles for sale; but each Society exhibits (generally) its own articles alone, and ignores those of other Societies and of individuals unconnected with itself; and, having to a great extent, a pecuniary interest in the articles which it exhibits, is not very ready to introduce competitive novelties.

The interests of education require a central depôt for the juxtaposition and comparison of the things recommended and approved by all the educational bodies, of the inventions of individuals unconnected with them, and of the material results of the different systems of instruction.

Great advantages would ensue if, from such a centre, specimens could be circulated throughout the United Kingdom; and, if a systematic mode of co-operation with Foreign countries could be effected.

The present Exhibition affords an admirable opportunity for the commencement of a Museum of Education. The collections at St. Martin's Hall comprise contributions from—

1. Governments, scholastic establishments, and individuals in foreign countries and the colonies.

Many of these articles have been already placed at the disposal of the society for a permanent museum, and many more would doubtless be gratuitously applicable to the same object, if it were certainly known that such a Museum would be established.

2. Public Boards and Societies for promoting education, and Schools, public and private, in the United Kingdom.

Many of these are already at the Society's disposal, and it is probable that nearly all of them might be obtained gratuitously, or at a very low cost.

3. Manufacturers and vendors of books, maps, and apparatus.

The whole of these would probably be available without charge. Their admission to such a museum would be the best possible advertisement of them.

Such a museum is not likely to be of a self-supporting character, and the Society of Arts has no means applicable to the maintenance of such a museum in a state of progressive efficiency.

The Society of Arts, therefore proposes, that it should hand over to the Government such portions of the present collections as are the property of the Society, and that it should use its influence to procure for the Government such of the remainder as might be desirable, on condition that the Government should provide for the due arrangement and exhibition of the Collection in a permanent Museum to be kept up and added to from time to time.

If the Government should be unable to provide *immediately* for the due exhibition of the collection, but should be able to provide immediately for its safe custody, with a view to its being exhibited as soon as may be practicable, the Council would be willing to promote such an arrangement.

An early decision is necessary, because the present Exhibition must be closed at St. Martin's Hall on the 31st instant, and because the Society must immediately make communications to the owners of the articles exhibited, if it be desired that they should be placed at the Society's disposal for transfer to the Government.

The Society has reason to know that a public functionary of the United States has offered to purchase one of the largest collections in the Exhibition, and it is thought probable that similar offers may have been made to other exhibitors.

It would scarcely be creditable to this country that, when one of its Societies has brought together from all parts of the world a valuable collection of interesting and instructive objects, instead of means being found for retaining it permanently in public use, a foreign Commissioner should be allowed to purchase the collection and to transport it to the other side of the Atlantic.

By order of the Council,

P. LE NEVE FOSTER, Secretary.

The following letter has been issued to exhibitors, and no decision will be come to by the Government until the result of the replies to it are known:—

Society of Arts, Manufactures, and Commerce, Adelphi, London, 22nd August, 1854.

SIR,—The Council of the Society of Arts are in communication with her Majesty's Government with reference to rendering the Educational Exhibition permanent, as a public National Museum of Education.

The Council are desirous of ascertaining, before the present Collection is dispersed, how far the Exhibitors are willing to co-operate with the Society for this purpose, and I am therefore instructed to ask how far you will be disposed to contribute your collection for that object, and whether by way of gift or purchase, and, if the latter, upon what terms, on each of the following assumptions.

1. That the Government should become the proprietors on behalf of the public.

2. That the Government should take upon itself the entire charge of such an Exhibition.

3. That the Government should merely provide a place for exhibiting them to the public.

The Council feel assured that in a matter of such national importance, Exhibitors will be disposed to act liberally where circumstances do not admit of the articles being presented as a free gift.

I shall feel obliged by your reply *not later than Monday, the 28th instant.*

I am, sir, your obedient servant,
P. LE NEVE FOSTER, Secretary.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions, for this object amount at present to only £1,055 18s. 6d., including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

FIFTEENTH LIST.

	£	s.	d.
Charles Buxton . . .	20	0	0
William Seymour . . .	5	0	0
Jabez James (2nd donation) .	3	3	0

ABSTRACTS OF PAPERS, LECTURES, AND DISCUSSIONS.

FRIDAY, AUGUST 4th, AT 8 p.m.

MINERALOGY AND ITS APPLICATION TO GEOLOGY AND THE ARTS. BY PROFESSOR J. TENNANT, F.G.S.

The lecturer commenced by calling attention to the concluding portion of his lecture before the Society of Arts, being one of the series delivered on the results of the Great Exhibition of 1851.

The lecturer said it was desirable "to draw the attention of all persons likely to travel in foreign countries, especially to Australia, Cape of Good Hope, India, and Canada, to the great importance of a knowledge of minerals. There is no country in the world possessing a wider range of territory or greater mineral wealth than Great Britain; consequently, there is none in which the study of mineralogy is more important; yet the ignorance which prevails on the subject is astonishing. I am frequently receiving packages and letters of inquiry from our colonies, containing pebbles of quartz and bits of shining iron pyrites, which a few simple experiments would render unnecessary. A very small amount of knowledge as to the method of testing minerals, especially as to their specific gravity, would save months of anxious suspense, which must occur while waiting a reply from England. But I am not without hope that the ignorance which leads to such mistakes as these will gradually be dispelled."—*Lecture on Gems and Precious Stones, delivered at the Society of Arts, March* 24, 1852.

Members of the Society, by applying for it, might have had a copy, but he believed upwards of 400 copies were still remaining on the shelves of the Society. Since then the streets of London have been placarded with large papers; first advertising the John Bull "Gold Nugget" from the Victoria diggings, weighing 45lbs. 6oz. This yielded gold to the value of £2,500. Secondly, a piece of gold quartz arrived by the "Sarah Sands" from Ballarat, Australia, weighing 134lbs. 11oz., which was denominated the "Monster Nugget," and was exhibited for some time at the Globe in Leicester Square. Mr. Tennant said he was present at the melting of this piece in July, 1853; it yielded £5,532 7s. 4d. worth of gold, and was the largest yet received. We are informed by the public papers that gold in California has been found in value exceeding 45 million pounds sterling. From our own colonies immense quantities have been received; the exact amount it would be difficult to ascertain. He was informed, by competent persons, that it exceeded twenty millions sterling within three years. When conversing with those who had returned successful in gold collecting from our colonies, he found them unacquainted with the ores of silver, copper, tin, mercury, lead, antimony, bismuth, all precious stones, and many other minerals of considerable value, not only in a commercial point of view, but as a means of relieving the wants of the emigrant anxious to establish himself in a new country. Mr. Tennant doubted whether gold was the only metal worth searching for, and instanced the carboniferous formation of England, which in iron, coal, lead, limestone, and sandstone yielded more than twenty millions sterling annually. These few remarks would show the importance of the study of mineralogy as a branch of natural history, but yet it is very much neglected in England.

The lecturer then proceeded to enumerate the attempts which have been made in the present century to establish schools for mining. In 1804 Sir John St. Aubyn, Sir Abraham Hume, and the Right Honourable C. F. Greville, each possessed very extensive collections of minerals. That formed by Sir John St. Aubyn is now in the Museum at Devonport, and is rich in metallic minerals; that by Sir A. Hume, which contained many gems, was presented by Lord Alford to the Museum at Cambridge; the Hon. Mr. Greville's collection was bought by the trustees of the British Museum, and is rich in carbonates of lime. These gentlemen endeavoured to raise £4,000 for forming at the Royal Institution a scientific collection of minerals, under the arrangement of a good mineralogist, and of establishing an additional laboratory there under the direction of an eminent chemist, to be exclusively employed on the assay of metals, and for the advancement of minerals and metallurgy. At that time the Royal Institution had the best public collection in London. It had been formed by Davy in 1803, and been added to by Hatchett, Cavendish, Wollaston, Brande, and others. University College and King's College were established about 1831. The former has had the able assistance of Messrs. Phillips, Webster, and Morris; the latter of Sir Charles Lyell, Phillips, and Ansted. Mr. Tennant was appointed lecturer on mineralogy in 1838, and succeeded Mr. Ansted in geology in 1853. King's College possesses a good collection of minerals and rocks, exceeding 2,500 specimens, which are accessible to the students.

In 1838, Sir Charles Lemon made a most liberal offer of £10,000 towards establishing a mining school at Truro, in Cornwall, on certain conditions, which it is to be regretted were not carried out. Some very interesting par

ticulars of this noble offer are to be found in the Rev. H. Moseley's Reports on Elementary Schools; in the Minutes of the Committee of Council on Education, 1851-52, (Vide p. 13.) Parties are again trying to form an Elementary Mining School in Cornwall, and it is to be hoped they will succeed. If all those interested in mining considered the amount of capital lost in fruitless attempts to work mines, they would find it to their pecuniary interest to establish schools in all our mining districts. The engineer and agriculturist might, with our improved mode of transit by railway, introduce superior materials for constructing buildings and improving soils.

In 1851 Sir Henry De la Beche succeeded in opening the Museum of Practical Geology, and has some of the most eminent men as teachers. The collection comprises minerals, such as iron, coal, lead, copper, tin, salt, roofing slate, granite for paving our streets, limestone for constructing our buildings, clay for bricks and pottery, sand for glass, &c., &c. The obtaining of all these materials gives employment to a very large proportion of our population, and their value is upwards of thirty-six million sterling per annum.

The lecturer exhibited diagrams of the minerals entering into the composition of metamorphic and volcanic rocks, also those confined more particularly to sedimentary rocks. He pointed out a few instances of the easy method of distinguishing the most common. Thus, on the sides of rivers rounded pebbles of quartz and calcareous spar are frequently to be picked up, exhibiting no crystalline form. If quartz, it will not yield to the knife, and when broken exhibits a curved fracture like a piece of broken glass (see fig. 1). Calcareous spar, on the contrary, when broken, exhibits a rhomboidal form (see fig. 2). The

Fig. 1.

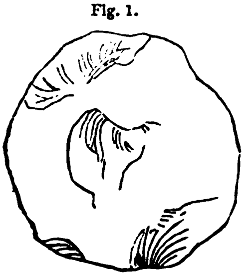
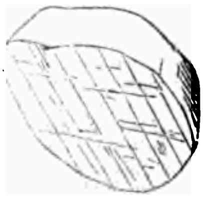


Fig. 2.



faces and angles are as smooth as though they had been polished by the lapidary. Calcareous spar is readily scratched by the knife, and is acted upon by an acid. In this way a student will acquire more information in a dozen or twenty lessons from a teacher who will select a number of minerals having some characters in common, such as schorl and oxide of tin; copper, or iron pyrites, and gold; heavy spar, and calcareous spar; cinnabar, and some varieties of oxide of iron; arsenical iron, and platina; than by reading volumes on geology. He stated that several instances of serious mistakes had come before him within the last few years, in which one mineral had been substituted for the other in commercial transactions.

To those who have an opportunity of studying our national collection of minerals in the British Museum, which is probably the finest in the world, having cost the government upwards of £30,000 independent of many valuable gifts from the Rev. Mr. Cracherode and others, the following remarks may be found useful:—The Museum is open Mondays, Wednesdays, and Fridays, also on Tuesdays and Thursdays for students, who have little difficulty in gaining access. First purchase a Synopsis, the price of which is only twopence; then, by referring to the index, the case containing particular specimens may be readily found. The collection is arranged in sixty cases, according to the chemical system of Berzelius; and by noticing the coloured border surrounding the labels, which are either red, green, blue, or yellow, on which the names of the minerals are printed, a thin slip of wood of the same colour surrounds all the varieties of that species. This is particularly necessary to be observed, because of some species there are many varieties, in others probably only one or two specimens.—A small written paper accompanies many specimens, giving the locality; by occasional visits of this kind and a good work on Mineralogy much information may be gained. The lecturer contrasted the present facilities afforded to the student with those of fifty years since, and referred to Professor Silliman's late visit to England. Another mode of obtaining a practical knowledge of mineralogy and geology is to visit the mountainous districts of the British Isles; and although not having the high mountains of Switzerland and other countries, the British Isles will yield to none in interest. He had frequently seen the students of Germany travelling in companies, and always recommended the same plan to his own students in the summer vacation, as it brought them back to attend the approaching year's lectures with additional interest, and often induced the careless young man to become one of the most diligent.

Monday, August 14th, at 5 p.m.

Method in Education; illustrated by the Right Method of Teaching General History in Common Schools. By Professor Nichol, of the University of Glasgow.

Prefacing with a few excerpts from those Catechisms and Manuals of History used in a large number of our English seminaries, Professor Nichol appealed to his audience, whether such instruction, so given, could be of the slightest use, and protested against the common notion that a fragment or two, selected because of its apparent simplicity, from the mass of a systematised subject or science, had any chance of appearing systematic or even intelligible to the child. He called attention to the fundamental maxim of all teaching, that the young Mind is a thinking organism quite different from the Mind of a Man; and, therefore, that a subject which appears systematic to the latter cannot be systematic to the former. Two things are indispensable as preliminaries to the teaching of any subject, or, what is the same thing, to the systematic exposition of it to the young. First, we must by careful analysis detect what are those general ideas upon the clear possession of which the intelligibility of that subject depends; and secondly, we must distinctly ascertain which of those ideas exist in the mind we are addressing, and with what degree of clearness they exist there. The accomplishment of this difficult task is the object of the *science* of education as distinguished from the *art*. The lecturer intended to treat the question of the teaching of History in this way.—What, then, are the ideas which lie beneath History, how do they exist in the young Mind, and according to what order are they developed?

History, in its widest sense, results from the *conflict and concurrence of the different Races of Men*. At the root of all knowledge of it, there lies the fact of the *existence of these various Races*. Now this fact is precisely one of that class which can be made most attractive to very young minds. At a very early age the child can have his curiosity and wonder aroused by descriptions and tales concerning the various forms and characters of human beings; and, as the succeeding step, he will be anxious to know where they live, what kind of countries they dwell in, and what are their habits. A teacher might, indeed, tell all this in a very dry way; but it could and ought to be done very differently. Geographical knowledge of an elementary kind would thus be communicated also; only the teacher must observe that the real difficulty here, is, that he is dealing with Minds having very indequate conceptions of *space*. The idea of *space*, however, is one of the earliest that the young mind successfully grapples with; and, by due care, it may be *educated* by the very process now spoken of. Next in order lies the fact that these various races *have not remained in their original abodes*; they have migrated, come

into collision with one another, supplanted and succeeded one another. Instances can be given, coupled with incidents of heroic adventure, which will profoundly impress this fact; and, as the child's mind is supposed to be advancing and growing into familiarity with this order of thoughts, he will gradually gather in the knowledge of the places of the earth which have been the chief theatres of these great changes. Geographical knowledge of the true kind is thus growing up; and, what is of paramount consequence, the notion of the *succession* of these massive changes, will gradually draw out or educate the still imperfect idea of *time*. Dr. Nichol remarked on the folly of considering *chronology* an elementary part of History. He had heard children repeating by rote long lists of dates, whose minds were quite incapable of estimating the relative value of such portions of time.

This point reached, the pupil may be safely supposed in possession of the nature and fundamental conditions of the phenomena of History: viz, the existence of various races of man, and the fact of their progressive intercourse and intermixture, having superadded a sufficiently practical idea of Time. The true historic desire will inevitably spring up.—the longing, viz.: to discern *how these changes succeeded each other from ancient times until now?* Dr. Nichol spoke of the value of *graphic representations*. He specified as applicable to the kind of teaching required at this stage, "The Stream of History" by Professor Strass. The portion of the chart in question, that referred to the epoch preceeding the fall of Rome, amply and clearly fulfils all possible requisitions; it speaks directly *to the eye;* and the teacher, with its aid, could find no difficulty in carrying the young pupil through a full reply to the question he had asked. The subsequent portion of the chart does not answer the requisitions. The author has here fallen into the error of almost all geographical map-makers who do not distinguish between the functions of a *Map* and the functions of a *Gazetteer*. Dr. Nichol showed how the events in Europe down to the 15th century, may be arranged into a few great masses. General history during that space of time does not require to recognise the relations of all the separate States, which were only preparing for *individuality*. Since the 15th century the true States-System has arisen; and its progress and development may very easily be depicted. These three centuries of history show,—*first*, the rise and fall of the ambition of *Spain; secondly*, the rise and fall of the ambition of *France;* and *thirdly*, the growth of the dominion of England, and the rise of Russia and Prussia. We cannot here follow the lecturer into details; but it is not to be doubted that, by aid of simple and easily-executed graphic representations, any ordinary class in our common schools, prepared as above described, might be intelligently instructed concerning all the grand sequences of History.

The *sequences* of History thus impressed, and the pupil's age and mind correspondingly advanced, occasion has arisen for profounder questionings. The problem of *causation* in history, now supervenes. This is, of course, the highest problem of all. It is not likely that much concerning it can ever be communicated in school. Dr. Nichol showed what might be communicated; and warned the teacher against certain great errors. He drew especial attention to the possibility of impressing clearly, views concerning the peculiar functions or characteristics of the predominant races and nations, illustrating his meaning by reference to the Jews, Greeks, and Romans. These intellectual and moral peculiarities are the causes, not only of much of the bygone positions of such nations, but of all their abiding influence over the world. He offered two important cautions; *first*, the teacher must, above all things, beware of meddling with what are called the *final causes* of history; *secondly*, he must guard the pupils against false moral judgments. The systematic and independent culture of the child's moral nature alone can prevent the study of history from leading to great moral mistakes. If not thus guarded, he will confuse the marvellous with the great, the successful with the worthy, and power with right.

Dr. Nichol will probably publish the whole lecture separately, accompanied with outline charts.

FRIDAY, AUGUST 18th, at 5 p.m.

ON SCHOOL ORGANISATION, WITH SPECIAL REFERENCE TO THE USE OF PARALLEL DESKS. BY THE REV. A. BATH POWER, M.A., &c.

The lecturer commenced by stating that he felt much satisfaction in taking part in the proceedings connected with the Educational Exhibition of the Society of Arts, an event specially calculated to distinguish the centenary celebration of that body. He regarded the formation of the Exhibition as likely to be the commencement of an era marked by more widely-spread interest in the cause of improved education, and believed its effect would be felt when the labour of the present undertaking had become a matter of distant memory, more especially, as had been suggested by the present effort, if the idea of embodying a permanent collection should be realised.

When the list of subjects for lectures and papers was first submitted to his notice, the lecturer felt some difficulty in selection, on account of its diffusive character; he had been guided in his choice by a wish to give a practical turn to the discussions, and thought the subject announced for the present occasion would answer that end. The subject in question involved many considerations of a most important character, which could only be briefly noticed in passing. In expressing his conviction of the value of the mode of organisation he was prepared to recommend, he desired to avoid speaking dogmatically, or to disparage other arrangements by which he knew great results had been accomplished; he was only, however, fulfilling a duty to his brother educators in communicating to them, after full and fair trial, this mode of organisation. He looked upon school furniture, of whatever kind, simply as a "material help," and had no sympathy with a teacher who could only work in one way. The educational maxim, that "a bad teacher will mar the best system of organisation, and a good teacher make something of the worst," indicated the spirit of his remarks. The lecturer then proceeded to explain his experience in connection with the Norwich Diocesan Model Schools, and called attention to some large diagrams he had had prepared, representing the ground-plan of the Norwich Schools, and the arrangements illustrated in the model exhibited by Earl Granville. He also commented upon the models placed upon the platform representing the Norwich Schools. These models, he remarked, were the work of amateurs, the master of the boys' school, and the governess and students of the Training Institution—and might be not disadvantageously compared to any in the Exhibition. He did not profess to trace out the history of parallel desks; there was no desire to claim priority of application, although in fact the memorandum on parallel desks, issued by the Lords of the Committee of Privy Council, was founded upon the experience of the Norwich Schools. The question was not who suggested this mode of organisation, but, does it work well in practice? Time would not permit of an explanation of all the plans represented in the Exhibition. He again desired that his observations would be received as those of a friendly critic.

The lecturer next proceeded to define the term organisation, as applied to school purposes, and dwelt upon the evil of depending too much upon system; bad teachers were apt to shelter themselves behind it; instead of relying on principles, they cling to a few technicalities, and lose the substance in grasping at the shadow. He had frequently been called upon to protest against the practice of depending upon the routine of a system, without regard to those deeper principles—without thought of that discipline of heart and feeling, in the absence of which, mere attention to technical detail, important as it

may be as forming one element of success, could effect but little of real educational value. If nothing had been accomplished by late efforts but to get rid of this erroneous notion, it alone would constitute a great advancement; he could conceive nothing more likely to retard the progress of improvement, than hasty and half-preparation for the high vocation of a teacher.

The lecturer next went into an explanation of the various modes of organisation which had been from time to time proposed, dwelling more at length upon those which had been connected with his own experience, enlarging at great length upon the method now adopted in the Norwich Model Schools. He explained that the plan of organisation by means of parallel desks was particularly well adapted to the monitorial or pupil-teacher system. He paused, to pay, as he considered, a just tribute to the value and importance of the pupil-teacher arrangements; he was glad to take advantage of that opportunity to express his conviction on a public occasion, that no measure within the memory of the present generation had caused so much improvement, and promised so much for the future, as those Minutes of Council which had provided for the introduction of pupil-teachers into our schools; he was glad to observe that this agency was in course of rapid development, and he hoped to see it making its way into all our market-towns and larger villages. The lecturer went on to explain that the arrangement in groups of parallel desks combines the advantages of separate class-rooms with the sympathy of numbers in the large room, both as concerns the children and teachers. He stated that it was adapted to all the subjects usually taught in elementary schools,—reading, writing, arithmetic, geography, grammar, elementary science, &c. He proceeded to notice certain objections which had been made; and stated his opinion that they may be usually resolved into questions of skill and right application of the method. The lecturer entered into a full explanation of the various points of detail connected with the use of parallel desks, and showed that these minor matters were of much importance in the right ordering and government of a school. He then described the use of the gallery in connection with parallel desks, and spoke of the great advantage of combining the mixed method with class instruction in the routine of elementary schools. He stated that the practice of taking places had been dispensed with at Norwich, and that no difficulty had arisen from the want of the stimulus of emulation in reference to the position in the class. It had been found enough to appeal to the high principle of truth and duty; and instead of the school suffering, its moral tone had been greatly elevated. The lecturer then noticed several of the modes of organisation represented in the Exhibition, and dwelt at some length on the model exhibited by Earl Granville, referring to the large diagram before-mentioned.

The lecturer said that, having considered those varied points of detail at as great length as time permitted, he wished once more, in conclusion, to speak a word of caution against trusting too far to those material aids alone. We might have school buildings with imposing elevations and faultless architecture, to greet the eye of the traveller as he passes through our villages—we might have the most perfect furniture, and every form of apparatus which ingenuity had devised—but we should be deceiving ourselves, and masking the wants of the children, if we rested satisfied with these; the material fabric and its appliances must be cared for, and the importance of doing this with a liberal hand can scarcely be exaggerated, yet the qualifications of the teacher must be also looked to in an earnest and enlarged spirit. If we are to make our education tell on the population at large we must continue to direct our efforts to the preparation of a class of teachers of high religious and moral aims, having hearts and minds imbued with the true spirit of their mission, ready to lay themselves out heartily in the cause to which by profession they are devoted; and in order that they may command the respect and esteem both of parents and children, as well as the confidence of those who see England's well-being and material prosperity involved in their labours, they must be instructed to the extent which will qualify them to give information of a character suited to the wants of the state of civilisation and progress of the community amongst which our lot is cast. Our schools are now drawing to them more of the regard of the people than they ever did; and if we are only true to ourselves, this great cause will daily claim more adherents, and the work will advance with accelerated rapidity.

The chairman (Harry Chester, Esq.) rose at the close of the lecture to commence the discussion. He stated that Mr. Power had treated the subject in his usual lucid and masterly manner, and considered it of much practical value to the present audience, among whom, if not mistaken, he thought he could observe many teachers. He then proceeded to comment upon several points of the lecture, and invited others to follow up his remarks. The discussion was continued for an hour with much animation; among the speakers were the Rev. M. Mitchell, Mr. Farrell, Mr. Shields, &c.

FRIDAY, AUGUST 18th, at 8 p.m.

Dr. Guy was unavoidably prevented from delivering his lecture as announced.

SATURDAY, AUGUST 19th, at 5 p.m.

ON THE HOME EDUCATION OF THE POOR, No. I. BY CARDINAL WISEMAN.

Having pointed out that the education of the wealthier classes, which he likened to the cultivation of the vine, did not terminate with their youthful days, but was continued through life—having shown that they enjoyed the full benefit of all the great discoveries and improvements of modern times, the lecturer proceeded to inquire whether the agricultural population derived proportionate advantages from the same sources. He did not speak of the class of mechanics living in great cities, or in those fervid centres of activity—the manufacturing districts—having access to reading-rooms, libraries, and lectures, in which a considerable amount of knowledge was sought to be communicated. He wished to speak of the agricultural poor, dispersed over the valleys and uplands of England, on the mountain sides, and in sequestered nooks where they had little access to information, and where what they did receive was derived from sources open only to themselves. The scanty education which the child of the agricultural labourer received he got in the parish school, and even that his parent often objected to, regarding him merely as a useful implement to be employed for his own domestic profit. The continuous system of education enjoyed by the wealthier classes was reversed in the case of the poor. Where was the literature prepared for them as for the rich, and proportioned to the learning they had received? If they were not to be made husbandmen merely, and taught agriculture alone from their infancy—if they were to receive education at all—it was necessary to provide that it should be continuous. It was requisite to show that we wanted a literature for the poor to excite the nation to exert itself to provide one. His argument went to show that we had none worthy of the name; but, before proceeding to do this, he turned aside to a description of the literature of the poor in France. He explained how it had been carried on for 300 years by the *colportage*, how annually from 8,000,000 to 9,000,000 volumes, varying in price from one-halfpenny to 10d., had been thus distributed—how little, in the lapse of ages, this literature had changed or been improved, and how, at length, the Government of the present Emperor had resolved to inquire into the character of the works thus circulated, with the view of prohibiting such as it considered noxious or foolish. On the 30th of November, 1852, a commission had been appointed, and, in consequence, the *colporteur* was required to have a stamp of

permission on every book that he sold. The publishers had also been invited to send in their publications to be examined, and approved or rejected. The number of works, in consequence, submitted had been 7,500, and of them three fourths had been refused permission to be put in circulation. He asked the meeting to imagine, with such a result, the state of the literature infecting every cottage in France, not for 5, 10, or 20, but for the last 300 years. Many of these books were filled with superstitions, and the exploded fallacies of astrology were still preserved in them as scientific truths. A great void had been created by the withdrawal of these works, and the question had arisen, how that was to be filled up. The Government had at first trusted to the exigency of the demand for a supply, and subsequently, finding that it did not come, had entertained the proposition of instigating men of real genius to prepare works on history, on agriculture, on elementary chemistry, and on other suitable subjects; but it had been considered dangerous thus to enter on a competition with the ordinary book trade, and the matter was still under consideration. His Eminence admitted that the institutions of England rendered it impossible to resort here to the summary process which had been adopted in France; but he drew a comparison between the literature of the poor in the two countries. He contended that, while in some respects ours had the advantage, in others it was not so. The influence of the cheap weekly press was unknown to our neighbours, and the inferior portions thereof distilled and disseminated the slow poison of their ideas drop by drop amid humble families whose previous education afforded them no antidote against its deleterious effects. He suggested the propriety of inquiry, by a well-constituted, duly-qualified, and responsible Board or Commission, into the literature of the poor, examining, analyzing, and classifying the works produced. Public attention would be arrested thereby to the necessity of providing wholesome intellectual aliment for classes who could not help themselves. The effects of pernicious literature were at least as worthy of being guarded against as those which affected the health of the body. Referring to the dissemination of religious tracts, he objected to sharp intellectual weapons being placed in rude hands that knew not how to wield them. The object of education, he said, should be to make the man more manly, the woman more womanly, the child more childlike, and, in one word, to humanize all. His object, in conclusion, he said, was to awaken attention to a great educational want,—the means of continuing the education of the poor after they had left school. Of the materials which existed for that purpose there was nothing in series, and all were left entirely in the hands of private speculation, and were in price beyond the reach of the poor. What most impressed foreigners visiting this country was the appearance of the labourer's cottage, so neat and white, with its garden, bearing the graceful fuschia, the variegated geranium and the queenly dahlia. They naturally inquired if that was the image of what was within. Those who were acquainted with the state of the agricultural population knew best how to answer that question. By rewards and commendations they had created in that class a love of the beautiful in nature, and made them careful and neat about the outside of their habitations. He hoped that the same influences would henceforth be brought to bear to induce the poor to cultivate equally the intellectual garden of their homes.

SATURDAY, AUGUST 19th, at 8 p.m.

ON OBJECT TEACHING; ILLUSTRATED. BY W. A. SHIELDS (PECKHAM BIRKBECK SCHOOL).

The lecturer, after a few observations on the subject of object teaching, proceeded to a practical illustration, by giving a most successful model lesson, of more than an hour's length, to a class of 130 boys and girls.

MONDAY, AUGUST 21.

The Secretary regrets that he is unavoidably prevented from giving an abstract of Cardinal Wiseman's second lecture, Mr. Curwen's lecture, and Mr. Cazalet's lecture in this Number, but hopes to be able to do so next week.

MONDAY, AUGUST 21ST, AT 8 P.M.

ON CLASSES FOR SCIENTIFIC OBSERVATIONS IN MECHANICS' INSTITUTIONS. BY ROBERT HUNT, F.R.S.

After dealing with the history of the rise and progress of Mechanics' Institutions, the lecturer proceeded to examine the causes which had led to their decline. He stated as the result of his experience, that there were but few Institutions in the country which could be regarded as pecuniarily successful. Nearly all of them were complaining that their funds were insufficient to carry out their designs, and that they were compelled to have recourse to amusements of an attractive character, to secure the number of members necessary to keep the Institution on its legs.

The lecturer advocated, in the most earnest manner, the necessity of providing rational entertainments for the people, but he insisted upon the incompatibility of entertainment and instruction in the same arena.

To the mistaken attempts which had been made to convert the lecture-room into a concert-room, the lecturer attributed the failure of the popular institutions. He contended that Institutions organised for the instruction of the people, should not devote themselves to their amusement, and if the doors of Mechanics' Institutions could not be kept open without the various kinds of entertainments now indulged in, one of two courses were open—shut the doors, or call things by their right names, turn literature and science out of doors, and boldly proclaim the institutions to be for the entertainment of the people.

The lecturer then remarked on the peculiar aptitude which was necessary to the correct delivery of a popular lecture on science, and quoted two examples of failure—in one case from too exalted a tone, and in the other from too low and imperfect a demonstration. That Mechanics' Institutions might be made to pay, the lecturer believed, provided they returned to their legitimate ground. He adduced the remarkable attendances on the courses of lectures on science at the Government School of Mines in proof of this.

A return to a system of instruction by detailed courses of lectures was advocated, and the inutility, the mischief, indeed, of single lectures, pointed out. In addition to this, Mr. Hunt, dwelling on the advantages of cultivating habits of observation, proceeded to the main subject of his lecture,—the organization of classes of observation in all our local popular institutions.

He then proceeded to say—

If men will return to the condition of the child, and seek to know the things by which they are surrounded, they may of themselves acquire correct habits of thought. They will then appreciate the lectures which may be delivered in their institutions, and be enabled to discover the true from the false, whenever these are presented.

Taking the country museums, or the museums in large towns, as a nucleus, where they exist, I propose that every Institution should add to its stores examples illustrative of the locality, and of it alone. Much money is spent foolishly in endeavours to form museums of curiosities—Indian arrows, grass hats, strings of shells, and New Zealanders' heads. These, from their necessary incompleteness, have little to interest, and still less to instruct. Let the money spent in this way be employed in obtaining specimens of the Fauna and of the Flora of a well-defined district, collecting examples of its earthy and metalliferous minerals, its geology, and any other objects of local interest which may present themselves. He would propose that this should be effected by the organisation of classes of observation in all the existing institutions. The task of

these classes should comprehend the collecting of the natural history specimens common to the locality, and the careful registration of all particulars concerning them—such as the period of flowering of plants, the appearance of birds in the districts, and the commencement of their songs; the appearance of fish on the coast, and the thousand points of interest which cannot fail to present themselves to the careful observer.

Such classes will furnish subjects for every taste, and accordingly the members might volunteer their aid severally in that particular one from which they would derive the greatest pleasure. The following may be named as a few of the divisions—Botany, zoology, conchology, entomology, mineralogy, geology.

Besides these, as sciences of observation, he would impress strongly the necessity of classes for meteorological observations, statistical inquiry, and archæological research.

Each class should meet at stated periods, and every member then report progress. Specimens should be examined, and if possible named; and the recorded observations should be carefully compared. Every class should have its note-book, and it would soon be found that a mass of information of the utmost value would be obtained. There should be quarterly meetings of all the classes, at which reports should be read, uncertain points should be submitted to general discussion, and unknown specimens should be referred by the secretary of the Institution to some acknowledged authority, to be described and named.

From having seen the experiment tried, I can vouch for the enlarged pleasures which every member of such classes of observation will enjoy. Each morning or evening walk is resumed with increased pleasure; the flowers of the hedgerow or of the brook are watched with attention; and all nature assumes new and brighter features. The rocks previously barren of interest, yield treasures—peculiar minerals are found—and strange shapes, telling the story of the progression of life on the earth, attract attention. All things appear to blossom with truths which had previously been passed unnoticed. There is no locality which has not some new facts to tell; and in collecting these each institution will provide the best exercise for the minds of its members, and add something of value to the common store of knowledge. Annual conferences should be held in connection with the Society of Arts; at these, well digested reports should be made, and these should be afterwards printed and circulated to every Institution in the United Kingdom.

To listen to a lecture from a man of ability is good—to read with attention is good—but to observe is infinitely better than either. This system most intimately connects itself with class lectures; the man of science might direct the enquiries of the members of the Institutions, and he would himself derive valuable assistance from their labours.

He had advocated such a system as this before, and he should continue to advocate it. The Popular Institutions of England are now wasting their powers—and, having no restorative element within themselves, they necessarily must decline. If we can organize a system of *work* for all,—a great industrial scheme—rely upon it, good must result. Let us try the experiment,

> Let us, then, be up and doing,
> With a heart for any fate,
> Still achieving, still pursuing,
> Learn to labour and to wait.

WEDNESDAY, AUGUST 23rd, at 8 p.m.

ON PUBLIC INSTRUCTION IN HOLLAND AND BELGIUM. BY JOHN YEATS, F.R.G.S., PRINCIPAL OF THE MIDDLE SCHOOL, PECKHAM, SURREY.

The lecturer said that it would be impossible for him to do justice to his subject within an hour. He would confine his attention to two or three matters from which he conceived something might be learned. Mere criticism on these countries he disclaimed,—he would go no further into comparisons than were indispensable, pledging himself also to make use, wherever possible, of original documents only, and thus to allow the Dutch and the Swiss to speak for themselves.

The first point to which he invited notice was the fact that in those countries a system of national instruction existed; not exactly compulsory, but one very much under State control. He traced the origin of social coercion, and compared the working of government instruction with the results of private enterprise swayed by public opinion. He maintained that the tendency of the times was in favour of the latter, and that as freedom of opinion advanced and found expression, liberty of instruction also progressed. He instanced the movements of Belgium, Holland, and Switzerland, in corroboration of his views.

He admitted that a system of national instruction was a great boon to a country, inasmuch as it necessitated union and organisation,—gave a record of experience, publicity and prominence to the idea which education embodied. Our Continental neighbours, he said, had consecrated to the development of this idea a portion of the authority and influence of Government; they had assigned to it Professorial chairs in their Colleges and Universities, while we had, as a nation, done little or nothing in that direction. He believed that there might be an over-production on the part of government, even of teachers and learners, if these were mere bookworms, or so far imbued with literary tastes, and under the influence of literary habits as to find the industrial pursuits of life irksome and uncongenial. But there was no fear of an over-production of real knowledge; none, of the robust health, practical ability, and common-sense information, which government might also aid in imparting.

The lecturer next showed a number of Dutch and Swiss lesson-plans, as well as a mode of registering school work, that he deemed worthy the attention of Inspectors. He advised the enumeration of hours in a school-term, no less than subjects of instruction on the wall, that the proportion of the one to the other might never be overlooked.

He spoke of the advantage of a study of the modern languages, and even recommended that colloquial Latin should be introduced into our grammar schools. He showed the difference between the teaching of one's own language to natives and to foriegners. He gave the chief characteristics of Dutch and Swiss instruction, and accounted for their excellence in principle and plan, from the fact that all the teachers were men trained to their task. He spoke warmly of the harmony between masters, assistants, and pupils, and believed that it arose mainly from the general prevalence of right educational notions. This latter point especially, he illustrated by several striking anecdotes from both countries. Far from painting indiscriminately "couleur de rose" he adverted to the overworked, underpaid, continental teachers of the past generation, men to whom much had been promised, from whom a great deal had been exacted, but for whom little was done by public or private purses. In drawing a parallel between the state of things in Holland and Switzerland, the lecturer thought that the private schools of the latter country had obtained more notoriety than those in the former, although the Crown-prince of Holland had been educated in the private establishment of Messrs. De Raadt and Kramer, near the Hague. He thought the Dutch rather excelled in instruction, while the Swiss were essentially educators; he instanced the lives and labours of Pestalozzi, Fellenberg, Père Gerard, Curathli, and Loder. He communicated several passages from his own reminiscences as a Hofwyl teacher, an "Erzieher," as well as a "Lehrer."

After alluding to the strong religious and moral feeling pervading the Dutch and Swiss schools, he pointed out the distinction of the laws of the two countries, relating to the teaching of points of faith and systems of religion,

that while such was required of a teacher in most parts of Switzerland, it was forbidden in Holland by the fundamental statutes of 1801 and 1806.

Next he traced the history of instruction in the Low Countries, and dwelt with most earnestness on two points, namely—1. That the national system of instruction owed its origin and its efficacy to the efforts of private individuals and private societies; he dwelt more particularly on the part taken by the "Maatschappij tot Nut van het Algemeen." 2. He showed that when private individuals, public bodies, and even the government, had done their utmost, nothing was accomplished practically until the working teachers of the land took the matter up. When recourse was had to them, and their support obtained, the public at large soon sympathised in the movement. Fathers and mothers took an interest in the work of the schoolmaster, the latter was animated and supported by the pressure from without, and reform progressed. So rapidly, indeed, that in a few years Cuvier was able to recommend it to the notice of the French Government.

In summing up, the lecturer believed that while the lowest stratum of society received better instruction in Holland and Switzerland than in England, the middle and higher classes were pretty nearly on a par with us. He had disclaimed comparison, but he thought that both England and Scotland could furnish schools as well-conducted and as satisfactory every way in their results as any part of the continent, and he had enjoyed good opportunities for becoming acquainted with some of the best of the schools between the Baltic and the Bay of Naples. Wherever public opinion could be brought to bear on teaching, he held that there is no ground for alarm; but where that is not the case, where the mind of one Minister of State is to be the mould in which the minds of a whole people are to be cast, he maintained there was great cause of apprehension. He urgently pleaded for efforts in favour of unity and general organisation amongst teachers, but asserted that if they would be true to themselves and to their trust, they wanted help from none. He stated that his views were the result of experience; he would not wish to be severe on amateur educators, continental tourists, or travellers, but he would counsel them before going from home to study the languages of the countries they wished to write about, were it only for the advantage of understanding the criticisms they provoked on their way, and the comments which, when noticed, their "books" sometimes occasioned.

LIST OF LECTURERS.

The secretary exceedingly regrets that an error has occurred in the insertion of Mrs. Butler's name, whose address is 3, Oakley-square, Regent's-park, as recommended by Highgate, in place of Mrs. Fanny Kemble, whose address is to the care of John Mitchell, Esq., 33, Old Bond-street, London.

COLONIAL AND INTERNATIONAL POSTAGE ASSOCIATION.

Report to the Council.

Gentlemen,—This Association, having for its object the establishment of postal communication between all nations, by means of the lowest possible uniform charge for ship transit of letters, was formed during the period of the Great Exhibition of 1851. It was felt that the opportunity was peculiarly eligible to attempt the extension of the benefits of a cheap and uniform system of postage to international and colonial correspondence, thereby facilitating commercial intercourse and cherishing friendly and domestic ties between persons at a distance from one another. Many of the Foreign Commissioners accordingly gave in their adhesion to the objects of the association and enrolled themselves amongst its members.

At the outset of their labours the Council mainly devoted their efforts to collect facts and to draw public attention to the defects and anomalies of the present arrangements, to receive and discuss plans for their correction, and generally to promote the discussion of the question in this and foreign countries, and in our own colonies.

The principles which the Council have constantly kept in view in their advocacy of the objects of the Association are those enunciated by Mr. Rowland Hill in his original pamphlet, wherein it was made manifest that the cost of conveyance depends upon the number of letters and not upon the distance, thus rendering the justice of a uniform rate evident, and showing that the simplicity and convenience of prepayment would apply with equal force to Colonial and Foreign correspondence.

The Council in the progress of their labours have arrived at the conviction that no material obstacles would be found to exist in the adoption of a scheme of international postage combining the three essential requisites of prepayment, uniformity, and economy, notwithstanding the differences of coins, weights, and measures, prevailing in different counties.

They became sensible, however, that whilst our own most exorbitant system of colonial postage was in operation, it would be vain to hope that their endeavours to enlist the sympathies of foreign governments in behalf of such a project would be attended with any successful results. The British empire being considered as a whole in the eyes of foreigners, the force of our example would appear opposed to the policy recommended for their adoption.

The anomalies of our colonial postage system were therefore the first to engross the attention of our Council. Earnest representations were made to the government, which in consequence of active correspondence entered into by the Council were actively seconded by the Colonies, most of which petitioned the legislature to be placed on the same footing as the remainder of the empire.

A highly influential deputation waited upon the Postmaster-General on the 5th of March, 1853, when it was announced that government had so far met the representations of the Association as to reduce the rate of postage on colonial letters to sixpence per half-ounce, of which sum one penny was stated as being intended to cover the expences at home, one penny those in the colony, and fourpence those of ocean transit.

Much as the Council have reason to be satisfied with the recognition of the principle of uniformity, they regret that the government did not decide upon a rate more in conformity with the objects of the Association. They are, however, not without hope, that a further reduction in colonial postage will at no distant date be found practicable, the more so as it has already been found possible to reduce the postage on books to sixpence per half pound.

Taking this into consideration, the Council did not deem it advisable to press the case of colonial postage further for the present, but resolved to turn their attention mainly to foreign postage.

With this view they set aside all ordinary diplomatic forms, and have placed themselves in direct communication with the Ambassadors of Foreign Countries at the Court of St. James's, and even with the Ministers of most European Governments.

They have the gratification of stating that from all, without exception, they have received the most encouraging promises of support.

When I undertook the mission of visiting the most important continental governments with a view of ascertaining their dispositions towards the objects of the Association, I obtained interviews with the Ministers of Russia, Austria, Holland, Belginm, Spain, Rome, Tuscany, Sardinia and Tunis, with equally satisfactory results. Most of these Ministers have forwarded letters to the Association expressive of their perfect readiness to co-operate with us, as I stated in detail in my report dated 26th April, 1853. The Council also resolved to send me as a Special Commissioner to attend the International and

Statistical Congress, held at Brussels during the month of September last, with the view of submitting to the Congress the plans which the Association proposes for the attainment of its object, and after a long discussion a vote expressive of sympathy with the aims of the Association was obtained from that distinguished assembly.

All this has been already done, and I now beg to submit to the Council what in my humble opinion still remains to be accomplished.

I think that the Paris Exhibition of 1855 may be made the means of maturing a project inaugurated during the Exhibition of 1851. I propose that a Postal Congress should take place during that period in the French capital, and it is hoped that every Government will feel the importance of the question sufficiently to induce each of them to send a representative to the same, for examining, discussing, and determining the general basis of this vexed and complicated question. The Governments of Belgium and Spain, and many States of America, have already given in their adhesion to this project, and have intimated their intention of sending delegates to the Congress. I anticipate that the most satisfactory results will accrue from the deliberations of a body of competent persons thus constituted.

In my opinion the best means of obtaining this end would be to address a circular (a copy of which I will submit to you) to all the Foreign Governments which have not yet sent in their adhesion. At the same time I leave for your mature consideration the question whether or not the following basis for carrying out the project might not be submitted in that circular:—

First.—That each country becoming a party to the convention, shall charge, collect, and retain the entire postage of all foreign letters sent outwards, and that it shall deliver all letters received from foreign post-offices included in the convention, free of all charge whatever.

Secondly.—That each country shall make what charge it pleases on all letters proceeding to foreign countries, but that the charge shall be uniform in all things to all countries parties to the convention.

Thirdly.—That in the case of countries through which mails are transmitted to other countries, a special arrangement shall be agreed upon, such as a definite sum, or other compensation, for such service, and no other charge shall be made.

Fourthly.—That as a general rule all postages should be prepaid, and when not prepaid ten times the ordinary charge should be made.

I suggest also, for the consideration of the Council, that a letter should be addressed to his Imperial Majesty the Emperor of the French, on whom, as I stated in my report dated the 26th April, 1853, I think depends almost entirely, the realisation of the objects of this Association.

I have the honour to remain, gentlemen,

Your most obedient servant,

MANUEL DE YSASI,

Honorary Secretary.

POSTAGE REDUCTIONS—FRANCE AND SARDINIA.

On Friday, 11th instant, the following information relative to foreign postage reductions was afforded in the House of Lords.

The Marquis of Clanricarde wished to know what prospect there was of any reduction being made in the postage of letters to France and Sardinia?

Viscount Canning would shortly state what had taken place, in order to prove that the Government had done all in their power to bring the negotiations on this subject to a satisfactory termination. At the time his noble friend left office there was a difficulty in inducing the French Government to accept the proposition that he made. While his noble friend proposed a reduction in the rate of postage to 6d. upon ordinary letters between France and England, he was not prepared to extend that reduction to letters, under transit in this country, from France to the United States. Subsequently a proposal had been made to the French Government conceding this point. The French Government might have been expected to accept that proposal, but impediments arose over which the Government had no control, and no definite answer was given to that proposal until December in last year, when an intimation was made through his noble friend, the Secretary for Foreign Affairs, that the French Government were anxious to deal with this matter by a personal communication. That proposal was made at a time of the year when it would have been inconvenient to send a person to Paris who could speak with authority, and, in consequence of this and other reasons, it was necessary to postpone any action upon this subject. Now that Parliament was drawing to a close, he had great hopes that negotiations would be carried on through the recess which might lead to a satisfactory termination of the matter before Parliament re-assembled. He thought that no reduction, short of a reduction to sixpence for an ordinary letter, would be satisfactory or acceptable to the people of this country, and there was every reason to believe that the French government shared that opinion. With respect to letters to Sardinia, no change could be made until a more satisfactory arrangement could be had with France; but the difficulty with regard to the high rates of postage upon newspapers between Sardinia and this country might, he trusted, be remedied without any previous arrangement with the French government.

On Thursday, August 10, Mr. Moffatt gave notice in the House of Commons, that early next session he should call the attention of the House to the importance of rendering correspondence with France as economical and convenient as possible, and to the favourable opportunity at present afforded for revising the existing Postal Treaty with this country.

ON ARCHITECTURAL MATERIAL, STRUCTURE, AND ORNAMENTATION AND THE WORKS OF MR. RUSKIN.

By W. Bridges Adams.

(Concluded from page 662.)

Supposing we had to select a site for a city, a hilly, undulating surface would be the most desirable, if possible with gravel soil, such as is in fact the case with the old city of London within the walls. For the purposes of commerce, the level is most desirable. The undulating is the most picturesque. In any case no city or buildings should be permitted to be erected without a sufficient outfall from the lowest point to get rid of exuviæ. It is quite clear that by leaving the whole surface for drainage, and permitting no underground erection, and having at least sixteen feet above the ground, and with a supply of water above the greatest altitude of the buildings, we should have the elementary conditions of health, and it is possible that the time will come when the good sense of the community will proscribe the erection of dwellings in marshes and alluvial soils only fitted for the growth of vegetation—possibly by law—but in any case by education, that will render it impracticable for a man to let a house in an unhealthy site, even if he be unconscientious enough to build one.

I come to the conclusion that, setting the question of cost on one side, Gothic structure is not adapted for the streets of business in commercial cities, but that the style of architecture formed by intersecting vertical and horizontal lines is pre-eminently so, and that out of such structure, and the use of iron and glass materials in permanent colour, will grow up a corresponding system of ornamentation and beauty. What is the Crystal Palace but a huge scaffold of upright and horizontal poles, and waggon tilt roofs and cucumber frames, in its constituent elements,

yet who will dispute the marvellous and fairy-like beauty of its myriads of intersecting lines and gossamer tracery and exquisite ethereal colouring, as we look upwards along the nave in the mellowing tints of evening, when the sun is about to drop beneath the distant horizon. Were it but as permanent as it is beautiful, the engineer and the artist might alike exclaim it is good, but structure has not reached the point in which such a building might be left for ages without repair, to tell, like the pyramids, the tale of its forgotten constructors to future generations of men. What then? what though it be like the famed palace of Nonsuch, that in byegone years filled men's minds with its marvels—doomed to disappear after a period; it will have fulfilled its purpose in leading the way to still further progress, after teaching and gratifying the existing generation, doing for the beauty and utility of the present time as much as Gothic architecture did for the middle ages; and more, incomparably, when we reflect on the mass of knowledge and facts placed before the eyes of the general community in a form from which they cannot choose but learn. As the building shows the new, so do its contents exhibit the old. It may be that ere it passes away, a new structure of pure glass may take its place, a vault of bright crystal, pure and translucent as the heaven above it, and with God's marvels of all beautiful vegetation below, which may win from Mr. Ruskin himself the involuntary exclamation "It is good," in utter oblivion if all that has been wrought out of stone by Gothic chisels in the olden time. The art of such a structure would be to exhibit no art, but a simple purity of colour as of the blue heaven or the green sea. And there would be one valuable feature of utility in it that it would be an entire and thorough non-conductor of electricity. It is the province of the chemist to work out the cheapness of the material. But for streets and roads of detached dwellings, the Gothic form is undoubtedly the most beautiful, for it harmonizes equally with the palace and the cottage, and more so when surrounded by shrubs and trees and that the beauty and utility be not incongruous.

There are two subjects on which Mr. Ruskin dwells with much earnestness, one involving a great truth, and the other a great heresy; the one, rescuing working men from mere drudgery, by making them intelligent originators of work according to their capacities, the other altogether prohibiting the multiplying processes in art. He holds that all processes which make man a mere drudge are mischievous, and there I can thoroughly agree with him. Man was intended to be intelligent, to use his brain as well as his hands, and, therefore, all processes dispensing with brains become the rightful occupation for inanimate machines; and herein Mr. Ruskin is at issue, maintaining that machinery still keeps up the drudgery, and that the desirable thing is that there should be no two artificial things alike as there are no two trees or plants, or men, or animals, alike. He carries this to the extent of making buildings with one wing, and irregular windows of all sizes and heights, and would not, if he could avoid it, have two pieces alike in a whole building. He would apparently have every brick made differently.

Now, though it is quite true that Greek sameness is painful and unnatural, like a tall centre and two short side ornaments on a mantleshelf, and though all trees vary, still it is true that there is a general resemblance in two pine trees of the same height; and a general mass of granite rock, varying in its outline, is very nearly alike in every cubic foot cut from it. In Nature many things are in pairs. Our two hands, two eyes, and two legs are so nearly alike that only very minute observation can detect a difference; therefore, the two sides of a Gothic arch should be alike, and if there be several windows of the same size and form it is obvious that in cast iron one pattern might serve for all. If diversity of ornament were required various patterns of ornamentation might be applied, and the patterns might be used for terra cotta, or machines might be made to cut the stone to any form, and so throughout the building, for all multiplied forms. Artists would be employed on patterns of easy wrought material instead of stone. And by this process many buildings might be produced instead of a few, and the many might revel in beauty, instead of being confined to hovels while the wealthy dwelt in palaces. Mankind are numerous enough to permit the multiplying of many patterns without a thing being common. Regent-street, with its inartistic multiplied stucco, is certainly better than the multiplied bricks in the streets and squares in the time of George the Third—huge walls, with square holes cut in them, and forming rows of dwellings. It is scarcely to be supposed that every house can be different from every other house, nor is it desirable. If every street varied that would suffice to pay for artistic patterns. I am not arguing that our temples should all resemble each other, or our other public buildings, but if all our private dwellings are to vary, and be produced at a moderate cost, we must contrive some variety producers of patterns analogous to the kaleidescope, or we must prepare patterns that may have a constant change in the mode of putting together to produce different effects. The very remark of Mr. Ruskin, that our artists must work in the clay fields ere they can produce beauty in stone goes to this extent, and if the clay can be wrought to be harder and more durable than stone, why should we use stone at all? Facility of production is essential to human improvement, and machinery is every day increasing our facilities. Common art, such as that of a countryman carving a tobacco-stopper, would, if carried to any extent, be only another kind of drudgery.

The division of labour has, it is true, been carried to a hateful extent—to a stupifying result. Continuance in one employment for a certain period is essential to perfect work, *i.e.* to acquire the skill; but, on the other hand, constant application to that employment will generate inactivity and distaste. The phrase "all work and no play makes Jack a dull boy" is pertinent; and it is forgotten that in most cases change of employment is equivalent to play. They must be very stupid people who can only acquire a single handicraft. The fact is that people are not generally so stupid, the fault being in that they are only permitted to acquire a single one. Even in the time when machinery existed not, the process of keeping men to one employment did not on the whole increase production. And now that manufactures, properly so called, have ceased to exist in many branches, and that they have become processes of machine facture, it is quite practicable that workmen should change from one employment to another, of an analogous nature, as for example, a carpenter to a chairmaker, a joiner or cabinetmaker, a founder of brass on the small scale to a founder of iron on the large scale, a gunlock-maker to a maker of doorlocks, a locomotive builder to a stationary engine-builder or marine engine-builder. In this mode, changing the employment at successions of a few months, the work would not grow wearisome and the result would be greater. The value of machinery is not merely that it multiplies man's work manifold, but that it also diminishes his drudgery and loss of his bodily strength, and where machine employment can be carried on in the open air without unpleasant exposure, or in well ventilated and not overheated apartments, it is the healthiest of all employment. It is not because that a man works by the aid of a machine that therefore his individuality is destroyed. The same machine can produce many varieties of work. In putting together a building a large quantity of squared or otherwise geometrically formed stone is required, and it is wretched drudgery to prepare this by man's hands; the machines can do it far better, and so also can they do all the laborious part of the carving. They can put the statute in the form in which the secondary workman leaves it for the finishing of the master. A machine does not necessarily make servile work, but may be used by the workman to express his own ideas when it is desirable; even as Mr. Ruskin has well and worthily pointed out. We do indeed require

that souls should dwell in men's bodies, that their light may shine through their work. Well does Mr. Ruskin object to Greek art inasmuch as it makes the mass of the workmen servile slaves to produce the idea of the individual, but it is strange that he does not see, that it is by the progress of machinery that the individual can work out his idea without crushing the natural faculties of other men—without making their handicraftry a mere plaster-cast of his pattern.

It is a desirable thing that all drudgery should cease, either in art or in utilitarian labour, when it can be avoided. It is written that man shall earn his bread by the sweat of his brow, but, rightly read, this means the sweat of the brain within the brow, whereby the powers of nature placed by the Creator at the disposal of man's unbiassed intellect will remove the necessity for all painful labour. God created man in his own image, and it is not a fitting thing that he should be degraded to the condition of a beast of burden, or of a toy for the amusement of frivolity. There is sound philosophy in Mr. Ruskin's insisting on the adaptation of work to that which is to gratify many eyes, and not to individual gratification. It is a base vanity that seeks to display on the person of an individual the wasted toil of the many, in hand stitching, as it were carrying about a crowd of retainers at second hand, merely for ostentation and purse pride. And it is only a more pardonable kind of vanity which prefers a private picture gallery of great works to a public one. The time is coming in which frivolous work will be less and less produced, and in which no work will be valued merely for the labour it has cost, but for its real beauty or utility, tested by the cultivated taste fast growing up in the community, and which Mr. Ruskin's works do so much to quicken and stimulate, even while we find parts of them contradict each other. He dwells at times strongly on the fact that all great artists have represented the familiar things of their own time. and yet no one can dwell with more vituperation on our utilitarian railways, that bring man and man together, and more and more destroy the probabilities of war. In truth, Mr. Ruskin is so much of an artist that commerce and manufactures in every form are distasteful to him, and he even deprecates the travelling spirit, because it has a tendency to prevent people from dwelling with pleasure on their own domestic architecture. He would almost oblige them to live constantly at home in permanent dwellings of Gothic architecture, each man beneath his own roof tree. This is not the tendency of the age. This is not the mode to lessen drudgery—not the way to increase beauty. Even as the many work at the temple in which the many are to worship, so must the many work at the dwellings in which the many are to reside, emigrating, even as the birds, to the places and climates best suited to their physical and mental health. The tendency is more and more to aggregate together, more and more to cover in larger spaces, more and more to mingle plants and buildings—to bring Nature's works in close contiguity to man's, which is only nature at second hand, and incessantly approaching more and more to the original. When rain falls and cold winds blow we need an impervious sky of glass, a more material ether.

Tested by Mr. Ruskin's proposition that "the first thing in a building is to ensure its purpose completely, permanently, and at the smallest expense," the Crystal Palace will not bear examination. The site chosen on the hill-top is eminently beautiful for its prospects, on all sides, but the soil is unmitigated clay, and it must be drained at a great expense. And it cannot be supplied with water without a great expense, so far as it appears at present. Again it points eastward, of all aspects the worst for a building whose terraces should command a view of the setting sun. The eastern aspect is for an early morning room in a dwelling, not for an afternoon pavilion. This is an oversight that will have to be amended at some future time by the removal of the western road to a greater distance and hiding it by a shrubbery. From the beginning of the world, east and west had their peculiar meanings, and in our northern climates the face of man is ever turned westward by choice as the day declines, to seek the healthy evening air arising from the sun's light and warmth.

The purposes the building is to be applied to are manifold. A garden or greenhouse and hothouse for every variety of plants. For this purpose warm and moist air in large quantities will be needed. It is impossible that these differing requirements can be obtained in a single building without partitions. The hot moist air and the playing fountains will keep the whole of the plaster work, whether in architecture or statuary, in a condition of moisture, and if there be occasional dust, the water-colour painting and gilding will gradually become dirtied, and will need constant repairs. Metal works will be spoiled unless kept in close glass cases. These various circumstances will render it needful that the building be divided into separate apartments, and the architectural effect of the interior will suffer. These difficulties will ultimately be overcome, but it must be by great alteration of plans. As in the old Gothic cathedrals, health and other considerations will demand the erection of screens that will destroy the effect of the edifice as a building. It will ultimately be found that the effect to the eye must be sacrificed in order to satisfy the other senses.

The cost of repairs must necessarily be great. So lofty a building on so high a hill, with so large an amount of glass and putty, must necessarily be exposed to contingencies, and the great height, though a striking feature, must enhance all the difficulty and risk of repairs. And whenever the iron work sheds a portion of its coat of paint, then will rust corrupt in the moist atmosphere ascending from the heated beds of the vegetation below. An essential in all iron architecture is, that it be either galvanized or covered with a material chemically and mechanically durable.

In truth, the great height is a great defect for all purposes of utility, of the kind of beauty that is sought. The materials employed might have been better disposed of in covering in a much larger area of ground. Before we shall understand this, we must get rid of many of our prevalent ideas on the subject of building. The beauty of a landscape is made up from the irregularity of surface. When we erect a building we invariably seek a level or horizontal plane. A mountain steppe or pampa is the ugliest thing in nature. Before we can accomplish our object of making a perfect winter garden analogous to a summer landscape, our mode of building must undergo a transformation we as yet have not even dreamed of. We must make our roofs follow the surface irregularities of the ground, covering a hill and valley at pleasure. Exceeding beauty might be obtained in this mode, but more is still needed. The mechanical arrangements must be such as to give open air, or close, over the whole surface at pleasure, and we have not got to that yet.

The building is not yet "permanent," nor does it "answer its purpose completely or at the smallest expense." The money outlaid might have done more, had people been foreseeing. But what then? It is a great thing to have accomplished the sight into futurity and thus to get a glimpse of what may be. And it is a good thing that Providence has so ordered the minds of men that their love of gain induces new discovery, which, even were it to have no pecuniary profit—were it even to result in total loss, is worth to the world at large immeasurably more than the loss to individuals.

Out of the original Exhibition building has grown the present, and also the Dublin, the New York, the Naples, and others. At the new Great Western Station at Paddington there is another offshoot, with an attempt to get out of the scaffold pattern into a kind of architecture. There are rudiments of great beauty in it of the capacity of iron, and colouring will do much more for it. The arch ribs tapering towards the summit strike the eye as

artistically and mechanically right where they spring from the columns, but the intermediates, running from straight girders between the columns appear as if they have no base. The girders should have been of an arching form, assimilating to the ribs, and in such case the eye would not have been offended. The compression principle of the arch resting on the tensile principle of the girder, is out of keeping. The girder resting on the arch would less offend the eye. Mechanically, no doubt, the girder is strong enough; the engineer has done his work well, but the artist has grouped his forms badly. And in the centre groins thrown in to give longitndinal thrust and keep the ribs vertical, the strength of structure would have permitted the rudiments to grow into greater beauty of form than has been attained. It is, in truth, owing to the haste required in modern days that structural iron has not put forth all its capabilities. The brains be as good now as in the olden time, and when was it before known that a building of the size and structure of that in Hyde-park could be put up and taken down like a child's toy in the space of a scant two years. Not by the result attained, but by the indications given, must our iron and glass structures be judged.

In all structural art it may be affirmed as a truth that what is mechanically wrong cannot be artistically right. If we examine the beautiful roof of Westminster Hall, our first sensation is of delight at the form and proportion the artist has given to a mass of timber,—as it were a skeleton Gothic arch of chesnut. Examined mechanically, it is a series of roof trusses with the central portion of the tie beams cut away. Were the angle of the roof obtuse, the walls would be thrust outwards, supposing the weight sufficient. It is a roof where every principal requires to be sustained, not merely against a wall, but against a projecting buttress. As it is, the roof has sunk, and the mechanician sees that the truncated tie-beams point downwards at an angle that denotes subsidence of the material, or outward thrust of the walls. To remedy this defect the whole roof must some day be taken to pieces, and re-formed, or it must be drawn together at the base, or expanded at the top by a vertical key, to restore the truncated tie-beams to the horizontal line.

There is an ugly building that stops the passage way to Fleet-street, called Temple-bar. We know what individuals all say to it when it impedes their movements simply as an obstruction, and we may imagine what Mr. Ruskin would say to it, but notwithstanding, it has its friends and defenders, some on the score of its artistry, as a work of Sir Christopher Wren, or Sir Christopher Wren's office boy, "trying his 'prentice hand," and others for its historical reminiscences—its national poetry. Mr. Peter Cunningham, while acknowledging its obstructive quality, gravely proposes to remedy this by removing the houses on either side to give roadways round it. Were this done purely and simply, the obstruction would remove itself, or at least take another form, for this cracked flat arch, during the stimulus of a passing omnibus or coal waggon would thrust out the pillars against which it rests, and which are now out of the perpendicular, and the room above with its waggon-tilt roof would fall down between them. Or it would be necessary to apply the modern tensile principle in the form of tie rods to present an abutting strain.

With exquisite perceptions of beauty in art, and most valuable as all must acknowledge Mr. Ruskin to be as an artistic critic, there seems to be in his mind a large amount of prejudice and bigotry. He is not a philosopher looking forwards, but an artist looking backwards. He does not speculate on the to-come. He will not believe that in the future there is more than in the past. He thinks that in stone and brick and Gothic principles are summed up the be all and end all of building structure and ornamentation. It seems that this is a Judaic cast of mind, a mode of thought that would, if carried out to the full extent, separate the New Testament from the Old, that would make a religion of Egyptian priests rather than of the apostles of progress. While disapproving of stagnant Greek, he holds fast to the stagnant Gothic, practically stagnant, for the builders who are reviving it in our modern days, make it as unlifelike as Byzantine figures on a monument. We bid fair to be drugged with imitation Gothic, as we have been with imitation Greek; and, sick to repletion with the modern Gothic plaster and brick and soft sandstone in endless succession, we almost turn for relief to the rustic irregularities of "churchwarden architecture" in country churches. In all forms, all materials, all mechanical principles, there are veins of beauty to be wrought out by unprejudiced artists, and we should hail with delight any sign that the faculities of Mr. Ruskin were as open to the appreciation of the capabilities of iron and glass, as of stone and brick.

In the report of the examination of the doings of Dulwich College, one of the witnesses complained that one boy "had been apprenticed to a builder of iron corrugated houses, which he did not consider a trade at all." This witness must have been a genuine descendent of the old guilds, thoroughly resolved to recognise nothing but what had been established by city charter. He would recognise trencher making but not modern crockery, and would uphold the Burgers' guild as more venerable than the gunsmiths'. If endowed with the genius of a Ruskin, he would maintain that "the captive of the bow and the spear" was a more poetical image than the four robbers shot down from a travelling carriage, engraved on the cylinder of a Colt's revolver.

Grateful are we to Mr. Ruskin for his high poetical imagination, grateful for the genius that brings byegone things before us in living beauty, rescued from the tomb of time. Grateful are we for the light his genius has shed on the works of Turner, grateful for his advocacy of the Pre-Raphaelites, albeit in some sort apocryphal. Grateful are we to him as a living voice to stir dead matter into being, and to proclaim the death of shams; grateful for all that he is, and sorrowful for that which he is not. When he stops short the world will yet go on, and the latter end shall even be nobler and higher and greater than the beginning. In tawdriness and glitter, in gloom and squalor, in the vice of the gin palace, in the tinsel finery of the sensuous theatre, in Cremorne or Rosherville, or Chalk Farm or Battersea, as well as in that which has grown out of them—the Crystal Palace—the religious philosopher can clearly see that the law of mankind is progress; and though it be true that "sight, thought, and admiration" are amongst the highest and noblest delights of man, still man is also a being born of the senses, and growing by aid of the senses to an appreciation of the noble and the true, expanding from the chrysalis state to a thought-winged inhabitant of upper air. The artists of Greece and Rome, and the more modern Gothic structurists, and artists wrought in stone because they had not other material. Dwelt they now amidst our modern metallurgists, with the art of electrotyping at their disposal, and the Parian plastic clay to mould at will, it would not be in brittle, perishable marble that they would seek to give their art to posterity. It has been but slowly that man has been acquiring a knowledge of nature's hidden processes. Long a student in her school it will now go hard but he will better her teaching, in obedience to the promptings of his instinct. With added progress, the engineer is each day making clearer the path of the artist, but it will only be when, as in the middle ages, and in the old times before them, that the engineer and the artist grow into one, that the birth of genius can be accomplished. Onwards and upwards, forwards and not backwards, is our motto. With the past for our monument and our shadow, we look stedfastly into the glorious light of the To come, step by step advancing through the haze of the imperfect to reach the boundary of the eternal. To the philosophic chemist, the philosophic machinist, the philosophic artist, and the more especially when these qualities are united in a single individual of strong moral and religious

senses, the partly blind pursuits in which most men are engaged, would appear laughable were it not for the knowledge that the lesser must ever by nature's law precede the greater, and that through gradual glimmerings only can the light be attained. Could each at a single glance perceive how every succeeding years eclipses and throws away the doings of the last, they would stop short in the cycle, and be tempted to stand fast each in his own peculiar Gothic and exclaim, like Mr. Ruskin, Esto Perpetua! But this cannot be. Even as the elastic volcano stirs up the sluggard gravitation of the earth, so does the ever new in man's progress eat up and digest the old and bring it forth into new and advanced life. The "pillar of iron" that Mr. Ruskin quotes from Scripture, may probably be, as the grain of mustard-seed, a type to overshadow the earth in the growing phase of architecture, a pure life copy of the vegetative tracery of nature.

ON MOUNTING ORDNANCE ON THE PRINCIPLE OF NON-RECOIL.

By Lady Bentham.

It is on this principle that mortars, the largest pieces of ordnance, and swivel-guns, the smallest, have always been mounted; and it is in conformity with this principle that every one holds a musket or a fowling-piece to his shoulder at the time of firing; yet all intermediate sizes of fire-arms are habitually mounted so as to re-coil.

In the year 1795, the then first Lord of the Admiralty became acquainted with the great success that, in a foreign country, had resulted from new modes of mounting ordnance for naval service, and sanctioned the arming of six experimental vessels according to Sir Samuel Bentham's own ideas. Sir Samuel considered that as to the gun itself, one of its most important improvements would be that of avoiding windage, and therefore he caused half of the ordnance for the sloops, the *Arrow* and the *Dart*, to be Sadler's guns, the other moiety being carronades, but all the guns 32-pounders. To exhibit in actual warfare the comparative advantages or disadvantages of the two principles of *recoil* and *non*-recoil, he caused half the number of the guns on board those sloops to be fitted in the usual way, on carriages to recoil, the other moiety of the guns on the principle of *non*-recoil. The four schooners, *Netley*, *Redbridge*, *Ealing*, *Millbrook*, had all of their ordnance fixed without recoil. Between the years 1796 and 1800, these vessels were employed in various services, in the course of which they had many encounters with the enemy, and were in all of them successful, so that the manner in which they were armed attracted the attention of many naval officers. Sir Sidney Smith, for example, as soon as his vessel, the *Tigre*, was fairly on her way to the Mediterranean, caused all the 68-pounder carronades to be fixed non-recoil, and Captain Bowen was the first commander who applied *officially* to have his guns so fixed. The many brilliant engagements in which the six vessels distinguished themselves proved the efficacy of the non-recoil principle; but Sadler's guns failed of success, not indeed, from their imperfection, but on account of the irregularity in dimensions of the shot, some balls being too small to fill up the bore of the gun, others, especially when much rusted, too large to be rammed home. After some years' experience, and at the request of the commanders of the *Arrow* and the *Dart*, Sadler's guns were taken out of the sloops, the recoil carriages removed, and all the ordnance on board was mounted non-recoil; namely, 32-pounder carronades, 28 in number on board of each of those vessels. The services of the *Arrow* and the *Dart* in the Helder, the engagement of the *Millbrook*, 160 tons, and a crew numbering but fifty, including officers and boys, with the *Bellone*, 63-gun privateer, 350 men, of whom 80 were killed during an engagement of two hours, though the *Millbrook* lost not a single man, induced a conviction of the superiority of the non-recoil principle; an opinion that was further supported by the result of the *Dart's* action in Dunkirk Roads with the *Desirée*, a fine frigate, which was gallantly attacked and taken by Captain Campbell, of the *Dart*, and added to our navy. Lord Nelson also expressed his opinion that the *Arrow* and the *Dart* were each of them, at Copenhagen, equal in force to a 90-gun ship of the line.

Thus by degrees the Admiralty became emboldened to introduce the non-recoil principle more generally; coasting vessels, such as Berwick smacks, and even dock-yard lighters, were armed with carronades fitted non-recoil; and, without any addition to the ordinary crew, were enabled to defend themselves against privateers, and spared the necessity of waiting in port for convoy. At length, after eight years' experience, the Admiralty informed the Inspector-General that they had ordered *all* carronades to be mounted on the principle of non-recoil. Many details had to be considered for the carrying their lordships' orders into execution; for instance, in consequence of the great diversity of the size and height of the portholes of the vessels as then built, how to proportion the height of the chock to such variable dimensions; so that, after some correspondence with the Navy Board, the Inspector General proposed that he should himself be charged with the duty of seeing to the due mounting of carronades. The Admiralty approved of this proposal, but the Navy Board remonstrated, and in compliance with their wishes the business was confided to their sole management. The General was soon afterwards sent away on a mission from our own government to that of Russia, but even before his departure he had seen carronades so fitted that on firing them the vessel itself must have been set on fire. On his return home, near the end of 1807, he found that the non-recoil system had been entirely discontinued, but never could learn on what ground it had been abandoned.

The same principle is no less applicable to long guns than to short pieces of ordnance like carronades, and the General had received orders to contrive and prepare models for mounting artillery of all descriptions on the principle of non-recoil.

The most prominent advantage of this mode of mounting guns are:—1st. Vessels and parts of vessels too weak to admit of mounting large ordnance to recoil, have been found during long-continued actions sufficiently strong to bear heavy pieces of artillery if mounted on the principle of non-recoil. 2ndly. That half the usual number of men suffices 3rdly. Each gun may be fired at least twice for once in the usual mode; and even in cases of emergency a single man suffices for the working of the largest piece of ordnance, provided he has strength enough to lift the shot. 4thly. The use of the gun is not prevented by foul weather, however bad. 5thly. The gun is in constant readiness for action. 6thly. No lashing is required on leaving the gun. 7thly. Much less room is required on deck for the use of the gun. 8thly. The expense of the gun-carriage is diminished by one-half. And to these advantages may be added the important one of superior safety of the crew. This seems inexplicable, but has been accounted for by the commanders of the experimental vessels; they have said that it is consequent on the rapidity of firing, but this question calls for further experience, though the commanders' views be supported by the few casualties on board of all the experimental vessels, and that though the *Arrow* and the *Dart* were so long exposed to the heavy fire of the Crown batteries at Copenhagen, their loss of men was not greater than that of other ships.

The present time seems particularly favourable for the reconsideration of the principle of non-recoil; for, if the *Times* of Tuesday last be correct, the flotilla of boats in the Baltic are half of them to be armed with howitzers, of course fired as usual without recoil, and this innovation may extend to fitting other kinds of ordnance on the same principle.

But it may be asked in what way was Earl Spencer induced to sanction the novel armament of the experimental

vessels? It was in consequence of his having been acquainted with an expeditious mode of creating and arming a flotilla for the protection of Otchakoff. A brief account of that flotilla is given as a note in Sir Samuel Bentham's "Naval Essay," and as that publication is in so few hands, a copy of the note in question is subjoined. It seems not irrelevant to present circumstances, for it speaks of the speedy erection of a powerful flotilla, capable of acting in shallow water, and also of modes conceived in this country to be impracticable, namely the fitting long guns one to draw out the other, and thus to render recoil of real use instead of disadvantgeous.

Should further details be desired as to the arming on the principle of non-recoil, they would be found in "Naval Papers" No. 7, and in "Naval Papers" No. 8, page 113 to 118.

Extract from "Naval Essay" by the late Sir Samuel Bentham.

As to positive proof afforded by experience of the superior efficiency as well as practicability of substituting guns throwing large shot to those only capable of throwing small ones, as my own experience happens to have afforded what appears apposite proof, I am induced to enter into some details respecting it.

On the breaking out of the war between the Russians and the Turks, in the year 1787, a concurrence of circumstances gave me for a short time, although in the land service, the command of the naval arsenal at Cherson, so as to put at my disposal such vessels, artillery stores, and men, as the place afforded, for the purpose of creating a flotilla with the utmost dispatch; this flotilla was intended, if possible, to afford protection to that part of the country against the threatened attacks of a very powerful fleet, as well as of a flotilla which the Turks had already at sea; and to oppose which the few Russian ships of war which lay at the mouth of the Dnieper were, from their imperfect state of preparation, as well as on account of their great draught of water, little to be depended on in action on this coast. As to the vessels of which the flotilla was to be created, some large boats and small sailing vessels were already ordered to be built; but in the mean time, the only ones in any degree applicable to the purpose were seven pleasure gallies, in which the Empress Catherine and her suite had descended the Dnieper on her way to the Crimea, eight barges or lighters which had been used to convey luggage on the same occasion, as also five or six men-of-war's long-boats.

On taking upon me the formation of this flotilla, I found that the ship-building department had considered that 3 or 4-pounders were the largest guns which the vessels in question were capable of carrying; accordingly they were some of them, put into my hands, already prepared for mounting ten or twelve such guns; the more or less efficiency of the mode of arming not being there, more than elsewhere, required to be kept in view by those entrusted with the construction of ships. On my part, responsible as I, on the contrary, made myself for the efficiency of the armament the preparation of which was thus confided to me individually, and considering that particularly against such a force as it had to oppose efficiency could only arise from the number and weight of the shot which could be thrown, my first step was to examine not merely the boats and barges, that is, the vessels which were to be armed, but particularly the implements of destruction to be found among the stores of the ordnance there. I found abundance of 18-pounders and 36-pounders, prepared for sea service, and for land service light brass mortars, throwing shells of from 9 to 13 inches, howitzers and other light pieces, 46-pounders and 96-pounders, most of which were prepared also for throwing hollow shells, some filled with materials for explosion, some for combustion; it was with these several most destructive pieces of artillery that I determined to arm the craft in question. The ship-building department indeed, as might be expected, urged their professional conviction of the impossibility of mounting any such pieces of ordnance on board any of these boats or barges, asserting that the decks could not support such guns, nor the bottoms any mortar; that the half-breadth of the vessels would not be sufficient for the recoil of any of the guns, since they could scarcely even be *housed* clear of the hatchways. Having satisfied myself, however, that these obstacles were not insurmountable, I proceeded to mount these large pieces of artillery on these small vessels in the following manner: The gallies already armed with one 8-inch and two 4½-inch howitzers, besides six or eight 3-pounders, I left, for want of time, as they were; the barges 97 feet long, 22 feet 6 inches broad, 5 feet 4 inches deep, were strengthened by the addition of a few pillars under the deck, the hatchways were removed from the middle to the sides, thus leaving nearly the whole breadth of the deck free for recoil; on board six of them were mounted eight long guns, 36-pounders, four on each side to recoil; the four on one side placed not opposite the four on the other, but opposite to the middle of the intermediate spaces; on board two of them I mounted six 18-pounders, three on each side, with a 13-inch mortar in the middle, as usual without recoil, having first strengthened the middle by a little frame work, to which I mounted also on each of these two vessels two 36-pounders as bow-chasers, so as to slide in groves, one on each side the middle line of the vessel, and attached one of these 36-pounders at each end of a single breeching, passed over a shieve fastened to the stem of the vessel, so that the recoil of one of these guns drew out the other; whereby the loading was effected entirely within board, and no labour or time was lost in replacing the guns after recoil. The common ship's long-boats were armed each with one large piece of ordnance, either a howitzer or a mortar, fixed *without recoil*; on one of them a mortar of the largest bore used for land service. These different pieces of ordnance were mounted all of them on board these boats without any distinct carriage by bedding the trunnions of the piece in two fore and aft bulk-heads, placed at the distance from each other suited to the breadth of the piece, and they were fired either point-blank, or at small elevations.

Having, when these fittings were completed, had the command of this flotilla next under Prince Nassau Siegen (to whom, though only a volunteer, was given, when he joined me, the honorary command), I had sufficient experience of the efficiency of the modes of arming adopted, particularly of the 36-pounders mounted to draw out one or the other alternately, (having pointed them myself on board my own vessel in the most important action), and as no time was lost in moving the guns for any purpose, either in the vessel where the recoil was made useful, or in others where there was no recoil, so great was the number of shot thrown by them that, I am confident, they did more mischief to the enemy than could have been done by vessels armed with twenty such guns mounted in the usual way. As to the actual efficiency experienced of the flotilla thus armed, besides the overcoming a flotilla of the Turks three times more numerous, the effect was in regard to the Turkish ships of the line, the sinking one, the taking one (in which afterwards sixty-eight guns were mounted) and the burning seven.

This flotilla afforded an example also of the superiority in point of efficiency of small vessels over large ones. The Turkish ships of the line, although armed as usual and making the best use of their guns, got aground, and, consequently, we did not fail to take advantage of the shallowness of our vessels, by placing them in that position in which few of the enemy's guns could be directed against us, and the smallness of our vessels gave us the farther advantage of being less likely to be hit by the enemy's shot.

To the English public the success of Russians against Turks, and that at a period now so long past, may be a matter of very little interest, but the *cause* of that success I look upon as highly deserving the attention of every one who interests himself in the efficiency of our naval force. On the occasion of any such extraordinary success in warfare, it is usual to attribute it to the military ardour and skill of the commanders and their crews, but in this case I think it must be admitted that, had the vessels been armed as they would have been in the official course of business, although every individual combatant had been a hero, the Turks in all probability would according to their orders, and considering their great force, have first destroyed this flotilla in their way to Otchakoff, and then have established themselves for a time at least in that part of the country. To what, then, can be attributed the success of these small vessels but to the mode of arming them?

Proceedings of Institutions.

GLASGOW.—The seventh session of the botanical class at the Mechanics' Institution, under the charge of Mr. Roger Kennedy, was brought to a close on Monday evening last, when Mr. Rankin, on behalf of the class, proposed a vote of thanks to Mr. Kennedy for the kindly and satisfactory manner in which he had conducted the class, which was warmly responded to. Mr. Kennedy is an enthusiastic botanist himself, and it is mainly owing to his eminent abilities and practical demonstrations in the field, that this class has become a favourite one with the

members, and has gone on increasing from year to year with marked success. At Mr. Kennedy's request the entire fees of the class are devoted to the purchase of new books for the Library, which is now thrown open to the public on payment of a small sum annually, exclusive of the lectures, which must be separately paid for. The Library contains about 6000 volumes, besides periodicals.

LIMERICK.—The project started by Mr. W. L. Joynt, president of the Literary and Scientific Society, to erect an Athenæum, in which all the local societies, scientific, literary and musical, and the School of Art, should have sections, with a large hall for general purposes, has been well received, and already the sum of £1400 has been subscribed. Owing to the high price of labour and materials, no immediate steps are to be taken for its construction; in the meantime great efforts are being made to increase the amount of the subscriptions.

PEMBROKE DOCK.—The annual meeting of the Mechanics' Institute took place on the 10th ult. From the report which was read by the secretary, Mr. T. Luke, it appears that the total number of members, including three honorary ones, is now 204. During the past year, 87 joined and 37 withdrew, leaving an actual increase of 50. The library contains nearly 1000 volumes. The reading-room is well supplied with newspapers, periodicals, and works of reference. The museum has received some additions. The attendance of members at the lectures has been small. In conclusion the report states that the nucleus of a fund for building an Institute has been formed, and further subscriptions are earnestly solicited. The receipts during the year amounted to £78 16s. 5d., and the expenditure to £72 8s. 2½d., leaving a balance in favour of the Institute of £6 8s. 2½d.

Miscellanea.

ROYAL CORNWALL POLYTECHNIC SOCIETY.—The annual exhibition of this Society is to take place at an earlier period this year than it has done for several years past. The change is made with a view to secure better weather than has been usual at this anniversary. Competitors must therefore speedily complete their productions. Special arrangements are being made for several lectures at the time of the Exhibition, on subjects connected with mines and mining. A portrait of Opie, the Cornish artist, painted by himself, has recently been placed in the Polytechnic hall, the picture being a bequest to the county from the late Mrs. Amelia Opie.

MEETINGS FOR THE ENSUING WEEK.

MON. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Mr. Harry Chester, "On Mechanics' Institutes."

TUES. Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Mr. J. C. Morton, "On Agricultural Instruction in Parish Schools."

SAT. Society of Arts Educational Exhibition, St. Martin's Hall, 5.—Mr. W. A. Shields (Peckham Birkbeck School), "On the Inspector and the Schoolmaster."
Society of Arts Educational Exhibition, St. Martin's Hall, 8.—Mr. Harry Chester.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Aug. 18th*, 1854.]

Dated 30th May, 1854.

1193. R. Tomlinson, Sale—Plasters for medical purposes.

Dated 20th July, 1854.

1591. R. Roberts, Manchester—Spinning machinery.

Dated 21st July, 1854.

1600. T. Delabarre and L. Bonnet, Grenelle—Preservation of meat.

Dated 24th July, 1854.

1624. G. F. Wilson and G. Payne, Vauxhall—Distilling fatty matters.

Dated 25th July, 1854.

1627. F. Preston, Manchester—Spinning machinery.
1629. W. Grundy, Bury—Druggets. (A communication.)
1633. T. Bell and H. Scholefield, South Shields—Borax.
1635. J. C. Hurd, Medway, U.S.—Cotton machinery.

Dated 26th July, 1854.

1637. J. Lanracraft, Westbourne grove—Envelopes.
1639. W. Church and S. A. Goddard, Birmingham—Ordnance.
1641. J. C. Purnelle, Tachbrook street, Pimlico—Motive power.
1643. L. C. Koeffler, Rochdale—Finishing yarns.
1645. T. Huckvale, Chipping Norton—Machinery for gathering crops.

Dated 27th July, 1854.

1651. G. Mumby, 9, Hunter street, Brunswick square—Bearings.
1655. S. Varley, Stamford—Reaping machinery.
1657. S. Frankham, Greenland place, Judd street—Furnaces.
1659. H. Wickens, 4, Tokenhouse yard—Railway signals.
1661. A. Law, Glasgow—Cranes.

Dated 28th July, 1854.

1663. A. Guild, Salford, and J. Peddlebury, jun., Manchester—Bleaching.
1665. R. Johnson, Manchester—Coating and insulating wire.
1667. A. H. Petit, Paris—Joining pipes.
1669. J. Gilbertson, Hertford—Furnaces.

Dated 29th July, 1854.

1675. G. E. B. Collasson, Paris—Arresting railway trains (A communication.)
1677. J. Fawcett, Gateshead—Gas regulator.
1681. H. Walduck, 5, Warwick court, Gray's inn—Propelling vessels.

Dated 31st July, 1854.

1685. H. Green, Liverpool—Hanging doors, &c.

Dated 1st August, 1854.

1689. E. Gillman, Twickenham—Paper.
1691. T. Evans, jun., 2, Belmont terrace, Lewisham—Rigging of ships.
1693. J. Mc Gaffin, Liverpool—Sheet metal pipes.
1695. R. A. Brooman, 166, Fleet street—Flax, &c., machinery. (A communication.)
1697. J. S. Holland, Woolwich—Locks.

Dated 2nd August, 1854.

1699. S. Lees, Salford—Purifying gas.
1701. C. Chevron, Paris—Looms.
1703. P. G. de Soresina, Bedford row—Treating flax and hemp.

Dated 3rd August, 1854.

1705. W. Rye and W. Crowther, Oldham—Steam engines.
1707. W. Gossage, Widnes—Soap.

Dated 4th August, 1854.

1709. L. P. Miles, Lewisham—Locks.
1711. S. L. Taylor, Bedford—Thrashing machines.
1713. A. Kortright, Com. R.N., James street, Adelphi—Marine compasses.

Dated 5th August, 1854.

1715. A. Boissonneau, Paris—Artificial eyes.
1717. C. F. Stansbury, 17, Cornhill—Furnaces. (A communication.)
1719. C. F. Stansbury, 17, Cornhill—Air-tight vessels. (A communication.)
1721. J. Gathercole, Eltham—Ornamenting stationery.

INVENTION WITH COMPLETE SPECIFICATIONS FILED.

1756. T. Lawrence, Birmingham—Bayonet blades.—11th August, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed August 17th, 1854.

378. Thomas Fawcett, jun., Lisburn—Improvements in weaving linen or other fabrics, to produce plaits or folds therein.
379. Thomas Telford Macneill, Mount Pleasant, Louth—Improvements in drying flax, straw, and other organic substances.
386. Robert Holt, Shaw, near Oldham—Improvements in machinery or apparatus for manufacturing bricks and tiles.
394. Bashley Britten, Anerley—Improvements in crushing, pulverizing, and washing mineral earths or ores, and amalgamating the gold and silver contained therein, which said improvements are also applicable to crushing and pulverizing other substances.
396. Nicholas Riggenbach, Basel, Switzerland—Apparatus for preventing incrustation in steam boilers.
404. Thomas Towers, Salford—Improvements in marking boards used in connexion with billiard and bagatelle tables, for registering and indicating the number of games played.
412. Victor Pernollet, 43, Broad street, Golden square—Improvements in machinery or apparatus for sorting or separating wheat and other grain from different kinds of grain, and for separating or removing extraneous matters from wheat and other grain.
432. Thomas Settle and Peter Cooper, Bolton le Moors—Improvements in machinery or apparatus for preparing, slubbing, and roving cotton and other fibrous materials.
433. Adolphus Oppenheimer, Manchester—Improvements in the manufacture of mohair velvet or mohair plush.
436. Charles Walker, Bury—Improvements in purifying water for steam boilers.
437. Thomas Danson Pruday, Rupert street, Haymarket—Improved apparatus for cooling liquids and edible substances.
459. Charles William Siemens, of Adelphi chambers—Improvements in electric telegraphs. (Partly a communication.)
521. William Edward Newton, 66, Chancery lane—Improved machinery for measuring and folding cloth and other fabrics or manufactured materials.
540. Pierre Amable de Saint Simon Sicard, Paris—Improvements in purifying sea and other water.
547. Thomas Dunn, Pendleton—Improvements in machinery and apparatus for moving engines and carriages from one line of rails to another and for turning them.
555. William Septimus Losh, of Wreay Syke, Cumberland—Means of decoloring resins.
560. John Blair, Irvine—Improvements in beds or couches, and other articles of furniture.
573. William Pearce, Haigh, near Wigan—Improvements in machinery for measuring, indicating, and registering the flow

of air, gas, and other liquids, and for governing the speed of steam or other engines.
600. Benjamin Latchford, St. Martin's lane—Improvements in saddlery or harness.
606. George Hopper, Houghton le Spring Iron Works, Durham—Improvements in pins for railway chairs.
612. Johnson Hands, Epsom—Improvements in kilns.
618. Thomas Stephen Holt and Charles Herbert Holt, Manchester—Improvements in steam boilers.
622. Alfred Trueman, Swansea—Improved furnace for the calcination of copper ores and other mineral substances.
623. William Weatherley and William Jordan, Chartham, near Canterbury—Improvements in steam boilers.
632. James Cavanah, Liverpool—Improvements in sails for navigable vessels, and in the apparatus for working them.
633. John Lilley, Birkenhead—New material suitable for spinning, either alone or combined with other fibres, and suitable to the manufacture of pulp; also certain machinery employed in the preparation thereof.
638. Thornton John Herapath, Bristol—Improvements in the manufacture of manure from sewage, which are also applicable to the preparation of other artificial manures.
684. Frederic Seiler, Interlaken—Improvements in the manufacture and construction of solid and veneered, tesselated, and other shaped woodwork, suitable for floorings, buildings, works of art, and other purposes.
688. James Newman, Birmingham—Improvements in the manufacture of metallic tubes.
695. John Jeyes, Northampton—Manufacture of pulp from twitch or couch grass.
846. James Childs, Belmont, Vauxhall—Improvement in subjecting fatty and oily matters and matters containing oils or fats to pressure.
931. James Warren, 75, Old Broad street—Improvements in the construction of railways.
976. James Hamilton, New York—Improvements in machinery for crushing quartz and other substances.
982. Alfred Trueman, Swansea—Improvements in the manufacture of sulphuric acid when roasting copper ores, and also when burning sulphur or iron pyrites.
1063. Charles William Feuillade Aubusson, Warren street, Fitzroy square—Improvement in ferrules.
1082. Richard Scott and Thomas Rowland, Basford—Improvements in machinery employed in the manufacture of knitted fabrics.
1088. George Edward Dering, Lockleys, Herts—Improvements in obtaining motive power by electricity.
1219. Joseph Robinson, Denton Mill, Carlisle—Improvements in apparatus for mixing wheat and other grain and matters
1227. Egmont Websky, Wustewaltersdorf, Prussia—Improvements in bleaching. (Partly a communication.)
1249. Andrew Spottiswoode, New street, St. Bride's—Improvements in the manufacture of fuel.
1253. William James Baille, Southwark—Improved mode of propelling ships and other floating vessels.
1274. Thomas Bramwell, Enfield house, near Gateshead on-Tyne—Improvements in the manufacture of the carbonates and prussiates of potash and soda.
1309. Charles Hargrove, Birmingham—Improvement in the manufacture of certain kinds of iron.
1314. William Gilbert, Pidduck, Camberwell—Improvements in the construction of vent pegs.
1316. Thomas Parramore, 50, Castle street, Southwark—Improvement in the manufacture of air-tight beds, and other articles required to be inflated and air-tight.
1317. David Lowe, Leicester—Improvements in knitting machinery.
1318. George James Hinde, Wolverhampton—Improved combination of materials to be used for the manufacture of pipes or tubes for drains, and for such other purposes as the same is or may be applicable to.
1338. David Bogue, Fleet street—Improved apparatus for facilitating the attachment of adhesive stamps.
1347. Nathaniel Clayton and Joseph Shuttleworth, Stamp End Iron Works — Improvements in portable and fixed combined threshing, shaking, and winnowing machines.
1348. Willoughby Theobald Monzani, St. James's terrace, Bermondsey—Improvement in brushes and brooms.
1408. Charles Beale, and John Latchmore, Leicester—Improvements in the manufacture of knitted shirts.
1410. William Yates, 7, Mary street, Bromley—Improvements in furnaces.

Sealed August 22nd, 1854.

449. Benjamin Joseph Green, Birmingham—Improvements in the manufacture of corrugated elastic materials.
461. George Collier, Halifax, engineer—Improvements in twisting fringes of shawl and other fabrics.
469. Frederick Westbrook, Kensington—Improvements in apparatus for facilitating the cleaning of windows.
470. Emile Chappuis, St. Mary Axe, City of London—Improved apparatus for the diffusion of light called illuminators.
476. John Morrell, Bradford—Stopping the tap of any vessel containing oil, treacle, or any other liquid as soon as the quantity required of such oil, treacle, or other liquid has been taken therefrom, such quantity being ascertained by weight.
480. Ellis Marsden and John Marsden, firm of Marsden Brothers, Liverpool—Improvements in pumps.
507. John Parry the younger, Liverpool—Improvements in mills or machinery for grinding or cutting bones, wood, or other like substances.
509. Hugh and John Ellis, Salford—Improvements in machinery or apparatus for stretching and finishing woven fabrics.
510. Andrew Barclay, Kilmarnock, Ayr, North Britain—Improvements in lubricating shafts and revolving metallic surfaces.
615. Peter Armand le Comte de Fontaine Moreau, 4, South street, Finsbury, London, and 39, Rue de l'Echiquier, Paris—Improvements in producing waterproof stuffs.
619. Joseph Pimlott Oates, Lichfield, Stafford, surgeon—Improvements in the manufacture of bricks, tiles, pipes, and such other articles as are or may be made of clay.
656. François Loret-Vermeersch, Malines, Belgium—Improvements in looms for weaving.
668. John Polson, firm of Brown and Polson, Paisley—Improvements in the manufacture of starch.
672. John Sheringham, Edwardes square, Kensington—Improvements in the construction of kettles, and other like domestic utensils, and in the means of supporting or retaining the same in proper position when in use.
734. William Simpson, Birmingham—Improvements in apparatus for communicating alarm signals on railways.
1136. Henry S. Rogers, New Oxford street—Improvements in fire-arms. (A communication.)
1202. John MacFarlane, Renfrew, North Britain—Improvements in steam boilers.
1234. Peter Armand le Comte de Fontaine Moreau, 4, South street, Finsbury, London, and 39, Rue de l'Echiquier, Paris—Improvements in producing a useful substitute for leather in various applications.
1300. James Kite, "Secundus," Princes street, Lambeth—Improvements in machinery and apparatus for expressing moisture from substances.
1303. John Davie Morries Stirling, Blackgrange, county Clackmannon, Scotland—Improvements in the manufacture of iron. (Partly a communication.)
1368. George Simpson, 8, Union buildings, Leather lane, Holborn—Improvements in furnaces.
1369. John Marriott Blashfield, Millwall, Poplar—Improvements in the manufacture of china, pottery, bricks, and other articles manufactured for the most part of clay.
1372. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn (City), London, and 29, Boulevart St. Martin, Paris—Certain new and useful improvements in machinery for forging or hammering iron, which may be also applicable to the hammering of other materials.
1374. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn (City), London, and Paris, 29, Boulevart St. Martin—Certain improvements in grate bars, and certain appliances to the same, for the purpose of preventing them from warping or twisting by heat.
1387. John Weild, Glasgow—Improvements in preventing the drainage waste of cargoes on ship-board.
1399. John Thomson, Newton-le-Willows, Lancashire—Improvements in centrifugal apparatus used in the manufacture of sugar.
1403. Emile Hubner, Mulhouse, in France—Improvements in machinery for preparing wool, cotton, silk waste, tow, and other fibrous materials.
1413. Charles Hastings Collette, 57, Lincoln's inn fields—Improvements in the manufacture of beer.
1417. Charles Iles, Peel Works, Birmingham—Improvements in metal bedsteads.
1425. Theophile Schlœsing, Paris—Improvements in the manufacture of carbonates of soda.
1428. Corydon Stillman Sperry, Connecticut, U.S.—An improved knitting machine. (A communication.)
1433. Daniel Towers Shears, Bankside, Southwark—Improvements in curing or separating moisture from sugar and other substances.
1437. Henry George Gray, Commercial Wharf, Mile End road—Improvements in preserving potatoes, roots, plants, grain, and seeds.
1444. John Henry Johnson, 47, Lincoln's inn fields, and Glasgow—Improvements in submarine navigation. (A communication.)

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Aug. 10.	3626	Improved Crotchet Needle and Holder...	John Thompson..................	Redditch, Worcestershire.
15.	3627	The Metallic Tessera Type Slip...........	William Howlett..............	Langbourne Chambers, Fenchurch street, City.
16.	3628	A Garden Water and Rolling Engine ...	Samuel Starkey	Holland House, Clapton, Middlesex.
22.	3629	Brim of a Waterproof Hat	William Jacobs	Dorchester.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 1, 1854.

MEETING OF COUNCIL.

THURSDAY, AUGUST 24.

The following Institutions have been taken into Union since the last announcement :—

367. Bradford, Mechanics' Institute.
368. Brighton, Royal Literary and Scientific Institution.
369. Huddersfield, Philosophical Society.

Educational Exhibition.

The Council of the Society of Arts requests the attention of the Members to the following statement:—

It is calculated that the total expenses of the Educational Exhibition, with the accompanying Lectures, Conversazioni, Conferences, &c., &c., if it receive the full development which its great importance requires, will not be less than £2,500. The Special Subscriptions for this object amount at present to only £1,079 18s. 0d., including a subscription of £100 from H.R.H. the President. A considerable sum will probably be received as fees for admission, but further Subscriptions are urgently required; and it is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid to enable the Council to carry out the undertaking in a manner worthy of the Centenary Jubilee of the Society.

SIXTEENTH LIST.

	£	s.	d.
J. S. Wells	1	0	0
Rev. W. Campbell	1	1	0
J. Buzzard	0	2	6
W. Evans	5	0	0
A Friend	5	5	0
Robert Wilson	5	5	0
Mrs. W. Wilson	1	1	0
J. P. Wilson	5	5	0

ABSTRACTS OF PAPERS, LECTURES, AND DISCUSSIONS.

MONDAY AUGUST 21st., at 5 p.m.

ON THE HOME EDUCATION OF THE POOR. No. 2. BY CARDINAL WISEMAN.

After disclaiming any desire whatever to suppress the existing literature for the poor by any violent means, the lecturer proceeded to give his views of what was needed to give it an improved character. On this head he spoke of history, biography, and science, the different branches of natural history, poetry, music, and art, and the necessity for works on these subjects being prepared by competent persons. He instanced the dry chronological abstracts at present issued under the name of histories, and recommended that by judicious extracts some idea should be given of the true spirit of history, as afforded by our great historians. He spoke of the charm which biography, when well written, possessed. Referring to poetry, he praised its influence, and said that a new set of popular ballads was wanted to warm the hearts of the people, and suggested Longfellow as one to fill up the gap. He reminded his audience of the well-known saying, "Let me make the ballads of a nation, and I care not who makes it laws." He alluded to the effect which such poetry, were it in existence, might have in infusing vigour into the prosecution of the war, and strengthening the hands of the Chancellor of the Exchequer, in allaying the grumbling anti-tax-paying propensities of John Bull; as an example he referred to the Cavalier songs of the time of Charles, and the Jacobite songs of a later date. With regard to art, the Cardinal said, that in order to create an appreciation of it in the minds of the humbler classes, simple pictures, in outline drawing, should be prepared for them. He combatted the notion that the highest intellects could not be got to lend their assistance to improve the literature of the poor.

TUESDAY, AUGUST 22nd, at 5 p.m.

ON THE TONIC SOL FA METHOD OF TEACHING TO SING. BY THE REV. JOHN CURWEN, OF PLAISTOW, ESSEX.

Mr. Curwen began by disclaiming the character of one who would force pupils of all ages and of all classes through precisely the same system; but there were certain principles of development proper to each subject taught, the general outline of which must be retained under all circumstances. He then referred to his own early difficulties in discovering those principles in connection with music. He was not finally satisfied until he became acquainted with the system invented by Miss Glover, of Norwich. From that time he determined to labour, to study, and to spend money, according to his ability, in making that system more popular, more useful, and more widely known.

On the subjects of "expression," "the cultivation of the voice," &c., Mr. Curwen acknowledged obligations to Mr. Lowell Mason, of New York, and to Mr. Delaspée, of Johannisberg. But the distinctive feature of the sol fa method—that from which it gained its name, and in which resided its chief power of usefulness, was its treatment of the subject of TUNE. It recognised the *tonic*, or key-note, of a tune, as *the starting point* of interval, and it used the seven *sol fa* syllables as *singable names*, by which the intervals—measuring always from the key-note—are *individualised* and fixed in the memory. He then compared the educational treatment of the subject of tune—which gives prominence to the *absolute* pitch of notes, with that which is founded on the *relative* pitch, measuring from the key-note, and showed that, in the former case, the pupil had to master a large number of separate and independent sounds, while in the latter case he was only required to be perfect master of seven related sounds. But the chief advantage of this latter course was connected with the fact that *the effect which a note produced on the mind* arose more from key relationship than from any other cause whatsoever. The mental effect of a given sound in absolute pitch might be completely altered by altering its key-relationship, but the mental effect of a sound having a given relation to the key could only be slightly modified by a change in its absolute pitch. Thus we had the *same* tune in *different* keys. Each note of the scale had, indeed, especially when sung slowly, a distinct and easily recognisable mental or emotional effect of its own. Handel, and all the great masters, understood this power of single notes. The lecturer here quoted, in illustration of the bold or strong notes of the scale (the 1st, 3rd, and 5th) Handel's "Arm, arm, ye brave," &c. He also illustrated this subject by experiment, requesting the audience to observe and name for themselves the effect in certain phrases which he sang, of the seventh of the scale, and then singing other phrases, in a different key, to figures, asking them to name the figures on which the seventh of the scale was sung. This the audience did in a cordial prompt manner. They also recognised the sixth of the scale in the same way. He showed that they had been enabled to do so by observing the mental effect of the note, and in no other way, for in each case he had taken care that the pitch, the syllable, and the immediate interval were all different. Only the key-relationship remained the same. These emotional effects which the

mind *gives* to notes in key (though *modified* by speed of movement, by rhythm, by harmony, &c.), more especially in the slow music of the earlier lessons, were very *noticeable*, and therefore very helpful to the pupil in individualizing the character of each note. This he had found even in infant schools. Mr. Curwen here gave a key-note to a class of children present, and singing to the open syllable *ah*, certain short phrases, required them to tell him what notes he had sung. This they did, with great readiness, even in phrases which contained the accidentals of transition and of minor keys. This was the fruit of the study of mental effect in key-relationship, and would soon enable these children to copy tunes by ear.

The lecturer then quoted the authorities of Morley, Dr. Crotch, Mr. Webb; and the most successful modern teachers, to show that there is a very general consent among teachers to the necessity of some means, *beyond what the ordinary notation affords*, for establishing the principles of key-relationship in the mind, ear, and voice of the pupils. This was done, on the method he advocated, by the "modulator"—a pictorial scale representing the principal key of a piece of music with its six related keys. The notes were shown in their exact and unchangeable places by means of their solfa names. It was an advantage that these names could be *sung* as well as said. The constant use of the same syllables to the same intervals gave them a remarkable mnemonic power. The facility of interpreting tune thus obtained by the pupils he would illustrate by asking a gentleman, not one who had taught these children, to lead them through an exercise of "following the pointer" on the modulator. The children followed the pointer, with their voices, very nimbly, and in every kind of interval belonging to the six related keys.

Mr. Curwen taught the audience, "by pattern" and from the modulator, to solfa a short chant. He then wrote the initial letters of the solfa syllables of the chant on a black board, and required he people to sing as he wrote. This letter-notation he described as only another way of pointing to the modulator,—for a modulator was soon established, by habit, "in the mind's eye" of every pupil. They could scarcely be said to teach so simple a notation. It sprang up in their path, and offered itself as a guide through the mysteries of the established notation. It also enabled them to print music cheaply. Indeed many of their classes among the really poor could not have had an existence if it had not been for the *cheapness* of the new notation. To show, however, that the established notation was not neglected, and that the aim of the method was to give a real mastery of it as quickly as possibly, he would put the pupils to a test. A tune copied from a German work, not known either to teachers or scholars, had been written on the black board. It contained wide intervals and some difficulties of time. The black board was then turned round, and the pupils solfaed the tune at sight in a manner which gave great satisfaction to the audience.

The lecturer concluded by saying that no singing movement must be a monopoly. It would require the united cordial efforts of many toiling hands and heads to fill all England with the blessings of song. The lecture was illustrated by about a hundred children gathered from nine schools, where they had learnt to sing almost entirely from their own teachers. They had, it was stated, only a week's notice of the meeting and one rehearsal together. The pieces which they sang were executed with accuracy and expression, and were received with marked applause.

FRIDAY, AUGUST 25th, at 5 p.m.

THE PATHS OF PHYSICAL PROGRESS. BY W. BRIDGES ADAMS.

The object of this lecture was to draw definite attention to the different branches of human industry, and the imperfect and indirect methods of the means used to attain the ends in each. The lecturer stated his conviction to be, that poverty, in the sense of privation of the necessaries and comforts of life, was not a necessary evil, but might be wholly obviated by seeing clearly the causes, and bringing right means to bear on the ends in view, not by making the rich, less rich, but the poor, less poor.

After a slight sketch of the different aspects and conditions of the human races, considered mentally and otherwise, he pointed out that the great distinction between man in his civilised and uncivilised condition, is that in the one case he subsists like the lower animals, subject to the natural *law of prey*, and in proportion as he becomes civilised he passes under the dominion of the *law of reason*, which he considered eventually destined at some future period, wholly to set aside the law of *prey*. But he considered that as yet the law of prey is still in the ascendant, though on the decline. He illustrated this by the various processes of competition amongst railway contractors, lawyers, coalminers, railway companies, and last by the Emperor of Russia; and that whereas formerly the law of prey was brute force, it is now more a process of finesse in the attainment of current coin as a portion of human arts.

Human wants—the great source of competition, might be divided into two branches, the necessities and the tastes. The necessities might be summed up under the heads of food, clothing, fuel, shelter, travel, defence, against violence, and commerce. Time only permitted the lecturer to dwell on the first four, and that desultorily.

Food was first considered in the simple and in the combined state. The idea was started that as chemical analysis shows that food is compounded of gases and minerals, that possibly some future synthesis might produce food direct from the gases and minerals, without bringing guano from Peru to convert into turnips, and the turnips into sheep, and the sheep into mutton, and so on into men. Abstractedly considered, the vegetarians were right in essaying to get rid of the not very pleasant idea of entombing dead animals in human stomachs, but a vegetable diet, in the present condition of the arts of agriculture and horticulture, would not suffice to produce an intellectual and energetic nature. The chemists were not yet far enough advanced, possibly the gasses and mineral bases of food needed some assimilating aroma to form the chemical link or flux to enter into union with our bodies. The flesh of tired animals did not nourish or assimilate though not diseased, and there seemed to be some analogy between animal spirits and ormazone. The practice of slaughtering animals for food was brutalizing, and slaughtermen were held as pariahs, which was unjust, and we had no right to set on other human beings to do a disgusting work; it was quite as unpleasant to eat as to slay animals. Moreover artificially tame animals are not wholesome, like wild animals, they are diseased in many ways, and no doubt eating diseased meat must induce kindred disorders in human beings. Large quantities of putrid fish and meat come to London, and are converted to manure, to reproduce vegetables and animals. Would it not be practicable to treat this damaged food chemically, destroy its original form and get rid of its deleterious matter, and so consume it directly instead of indirectly. Vegetables eat minerals, sheep eat vegetables, man eats sheep. Animal food engenders ferocity. No doubt concentrated food, occupying little space in the stomach, is better than vegetables, or the daily pounds of potatoes distending an Irishman's stomach, and, as the story goes, driving him to doses of alum to contract it, when getting on a better and less bulky diet. A tiger is a more energetic animal than even a horse fed on concentrated grain, showing that the highly nitrogenized food is best. Wheaten bread, mushrooms, and olive oil were analogous to flesh. Mushroom is vegetable flesh. The gardener, cook, and chemist, must be united in one person, ere all will be done in producing prepared vegetables, as has been done in producing artificial garden flowers. Fermented

liquors and alcohol were a kind of food to certain persons, and if suddenly abolished—if every kind of artificial stimulus were abolished—people would take to chloroform till some new kind of stimulus were produced by the chemists. Drunkenness would best be abolished by giving refined tastes.

The storage and preservation of food was considered in various ways, both for dried vegetables and flesh. The best mode of preserving flesh was by cutting into thin slices, and dessiccating it in rapid currents of heated air, leaving it in a nutritious state, which salting does not. Oil is now largely and cheaply made from coal, which as well as olive oil contains the flesh-making principle of nitrogen. May not the chemist some day prepare a kind of edible butter from coal. Cows' butter does not contain nitrogen. Many plants produce oil, and butter, and tallow; coal produces oil—why should not it produce the others. It is in those directions that the opponents of animal food must stimulate research to bring about their desirable conclusions. When the lower animals are not needed for man's use as food, or for other purposes, they will disappear, as whole races have done before.

The conclusion dwelt upon was that with the synthetical chemist lies the task of producing artificially the food of man by the law of reason, and the abolition of the law of prey. Improved philosophical processes in farm and garden operations, both chemical and mechanical, the lecturer had no time to glance at.

The object of clothing was described to serve three purposes—warmth, shelter, and ornament, The skins of animals, with the fur inside, not out, were the first garments, then the bark of trees, then the spun and woven garments made to this day by Patagonian women in the form of a poncho, or oblong cloth with a slit to put over the head, and drapery in graceful folds, made by the rudest of all spinning processes in the rudest of all looms: pegs stuck into the ground to stretch the threads, and passing the shuttle while kneeling over the work. The lecturer dwelt on the absurdity of our existing system of weaving flat webs of cloth, cutting them up into patches, and joining them together with thousands of stitches to make garments. He cited the seamless garment of Christ as the true pattern. Stitching was an absurdity, and society had brought a great evil on themselves by demanding the growth of a race of stitchers who outgrew the possibility of feeding them, even when Lord Ashley, with false political economy, took them in hand, and when overflowed by their numbers, he sought to escape by declaring that he only meant professed sempstresses. The stitching machine was now partly mitigating the evil by rendering such drudgery hopeless and useless, but the true remedy lay in producing the garments complete from the loom, accomplishing by machinery, what was done by hand in the olden time, without cutting or stitching.

Felting was a process of handicraft. Patent felt was not felt at all, but wool glued together by partly dissolving it in high pressure steam. Seven years back the lecturer had, in the *Westminster Review*, propounded machine-made garments, and at the Great Exhibition they were shown, as the subject of a patent, by Mr. Christopher Cross. These barbarous specimens, apparently made for negroes, are the forerunners of our future clothing when stitching shall be no more.

The lecturer then dwelt on the scarcity of wool, and the desirability of producing it artificially. It was gelatine, not soluble, save with great heat, existing as in infinitesimal tubes. Chemists would in time prepare gelatine from its constituent gases synthetically, and manufacturers would form it into fibre, either solid or tubular, of any size they liked. There was nothing in this more difficult than the preparation of a kind of horn combs from caoutchouc, and possibly caoutchouc itself, artificially, from its three gaseous constituents—carbon, hydrogen, and oxygen.

In perfect garments the nap ought all to lie naturally downward, as the hair of animals and the feathers of birds, impracticable in making miles of cloth by machinery, and making garments look rough and unsightly. The coverings for our feet are still an imperfect unventilated material. Our chimney-pot hats, though ugly, have advantages, in keeping a layer of warm air round our heads like a turban, useful both in hot and cold weather, against the heat of the sun and winter's frost. The uses of the beard were alluded to as a natural covering, and also the disadvantages, especially of lifting the moustache with the left hand while putting food into the mouth with the right, supposing it intended by nature for a respirator, as Mr. Chadwick asserts.

People have now grown natural in clothing, and require natural and graceful and economic garments, and it is to be hoped that the manufacturers who produce them, under an efficient patent, will amass a large fortune by the supply of the whole British empire, her colonies, and foreign countries.

Bed clothing was also dwelt upon, and the advantage of using only single blankets with a stratum of air above confined by a compartively airtight cover, not pressing on the person. In very hot weather a net hammock, such as is used by the natives of Guyaquil, was considered as the most healthy and capable of a slight swinging motion for ventilation.

The various kinds of fuel were discussed, and the necessity of coal in a highly populous and civilised country where cold weather prevailed. The fuel of various kinds were treated of. It has been our advantage that coal has been stored up in the deep cellars of the earth, or barbarians and conquerors would long ago have destroyed it. It is, with our iron, and our magnificent working climate, the means of England's greatness. It will enable us ultimately to dispense with catching whales. The imperfect mode of laying gas pipes, with rigid, and not flexible joints, and the consequent leakage, was considered. The getting rid of the smoky atmosphere of London the lecturer considered would be best accomplished by keeping up the City of London tax on the smoky or bituminous coal, and removing it from coke, anthracite, and other smokeless fuel. This would be a self-acting process, and amid the hosts of opposite witnesses in a matter of opinion, what smoke was, was as dubious as a horse cause, and having to be decided by the majority of evidence. It was earnestly impressed on the audience how cruel it was to roast stokers and engineers when in steam-boats for want of due ventilation, and how pregnant such neglect was with risk of fire, bursting of boilers, and other accidents.

Some new suggestions were made. The desirability of our chemists seeking sources of heat in other modes than in coal, inasmuch as the operation of raising it from the pits is at best an unpleasant and unhealthy one; and the probability is, that every year our labouring men will become more and more cognisant of improved position to be obtained by emigration; and every year the prices of colliers' labour, with our compound increase in the destruction of coal, will rise in value, and materially influence the value of fuel, and all things dependent on it. The other suggestion was the desirability of erecting works for heating air and supplying it pure to dwellings and factories, just as coke and gas is supplied, so that houses and factories might be aired and dried without lighting fires, and a summer warmth might always be maintained independently of the radiant heat of open fires.

Under the head of shelter were embraced many topics, —caves and hollow trees, and the earliest huts and dwellings of "wattle and daub." Had railway transit existed at the outset, London would have been a very different city. Southwark, and Kent, and Essex, and Surrey, lowlands and swamps, would only have existed as kitchen gardens and orchards; and possibly some great pestilence in these localities, where houses should never have been built, will one day open people's eyes, and the dwindling down of rents will bring about the condition of things that always ought to have existed. With our

rails, the dwellings should always have been been built on the highlands.

If London were to be rebuilt, the lecturer considered that no foundation ought to be laid at a lower level then ten feet above spring-tide highest rise. That the streets should be parallel to each other and at right angles to the river, and diagonally to both, which would give angles, and rounded corners, and open spaces, at intervals, whereon small clumps of trees might be planted. The heights of the buildings should not be above one-half that of the width of the streets. No individual should use his property to endanger the public health; nor should any one possess any property in the ground below the level of the streets, which should all pertain to sewers and drains; the mains should be in subways available at all times, large iron pipes being used, and the surface water should be separate from the subways. All the gas and water pipes should be in subways; the surface of the streets should be laid with rails, and a second street way, on iron girders, should be raised above them for foot passengers and light vehicles, so that in fact the first-floor would be the shops and parlours, and the ground-floor would serve as cellars and stores. The pavement should be thick glass at the sides, thus there would be no mud or dust.

The buildings should be fire-proof. No timber, or combustible material being used in them. The chimneys, if square or oblong, cast-iron section-pipes built into the thickness of the party-walls. A central cross wall, formed with arches to serve as a case or framing to the party walls, and the front wall work might be all glass in double thickness with iron bottom. The floors hollow, of slate above and below, with some air-holes bored between them, and holes for warming the room above, and ventilating the room below, ventilating pipes being built into the walls. The roof should be of glass, and form a greenhouse. Palace dwellings might be erected, divided into suites of apartments. In the year 1830 the lecturer wrote an article in the *Mechanics' Magazine*, on the "Better Housing of the Working Classes,"—in which the present Model Lodging Houses were proposed—but laughed at. He now proposed Palace Houses—which will be laughed at also—divided into sets of apartments, as in the new houses in Victoria-street, but of a quadrangular form, with gallery round, eight stories high, with well stairs and mechanical lift, to give people their choice; a kitchen on each floor, with lifts to all, one under the other; a steam-engine to supply hot and cold baths, warm and irrigate the greenhouse at top, about a third of a mile—taking the four walls of the quadrangle. Warm air should enter all the apartments at pleasure, adjusted by moveable slides, and a refrigerating apparatus. A garden should be in the courtyard, and a fountain. A public drawing-room, library, and coffee-room should be part of the establishment. It would be better if people of various classes dwelt in the establishment, as in French houses, keeping up the intelligent rule on the poor, giving high-minded, intellectual people, a strong hold on the poor but honest and manly of the labouring classes. A far better state of society than the old feudal system would thus be brought about, and a new London would grow up. With the facilities of such buildings, such drainage and ventilation, and all other capabilities, and the absence of smoke, London might become a more desirable abode than any of the continental cities, and people might have health and country together.

Building materials should be artificial. Natural stone is mostly too imperfect for durability.

The possibility of a new kind of winter gardens of great extent, at a very cheap rate, was dwelt upon, so as to place them within the reach of the poorer classes, without the necessity of their being hothouses in summer.

The subjects are of so wide an extent that they were merely sketched out, but they gave indications of the possibility of each one expanding into a separate lecture, when the details might be filled in. The other subjects, travel by sea and land, defence against violence, and commerce, were, as a matter of necessity, left wholly untouched. The writer has in view to add at some future time a sketch of the arts of life to the catalogue, pointing out that which is desirable to hold in view as the definite objects to be carried out.

SATURDAY, AUGUST 26th, at 5 p.m.

ON THE STUDY OF THE ARTS, ARCHITECTURE, PAINTING, AND SCULPTURE, IN CONNECTION WITH NON-ARTISTIC EDUCATION. BY THE REV. M. MITCHELL, H. M. INSPECTOR OF SCHOOLS.

The lecturer commenced by stating that among the omissions of the collection in the Exhibition, was all mention of fine art or of books that referred to it; that this was not so surprising as respected the education of the poor as of the rich, to whose education classical learning was deemed an essential. The subject divided itself into 1st. Art education for professors; 2nd. Art education, to understand and appreciate it. To this attention was directed. The fine arts include architecture, sculpture, painting. Are these mere materialisms, or has the spirit of a prophet breathed into these dry elements and bid them live and teach mankind? He then went on to show how architecture symbolised faith of various orders, and exemplified the manners, and customs, and habits of the people; that ofthe Egyptians, Greeks, the Gothic, and others, showed great knowledge of mechanical power of design, of effect, of adaptation of purpose, of symbolic meaning, and excited intense wonder at the wisdom, power, and intellect of those who had called these existences into being. He made, then, reference to the fact that in every age architecture had been only a symbol of other extensive intellectual influences. That the ages of Pericles, Augustus, Leo X., Charles I., Queen Anne, and Victoria, were noted for mental vigour as well as architectural excellence, and that therefore it must be believed that those of Nineveh, of Egypt, and Mexico, were so too; that wherever men congregated, *there* there must be good as well as evil; and that such edifices could not have been constructed by mere kingcraft or priestly dominion, but by the aid of men of earnest minds in lower ranks of society.

He then went on to state that different styles had their signification; some of peace and luxury, some of war and mutual distrust; that some architectures showed a debased and others an elevated religion. He then compared the prison palaces of Verona, Padua, Rome, &c.; the mean brick edifices of the London of 50 years back, with the Crystal Palace, whose iron betokened the strength, and glass the security of the people. It made reference to the curve lines in all old buildings, even to the plan of them as well as the columns, which is well shown in photographs. He alluded to a systematic departure from perspective in the Jesuit churches, which was explained by their doctrine respecting the host. To the steeple-like minarets in churches once subject to the Turks, and to the Trinity columns of Austria, erected in token of victory over Mahommedanism.

He then went to sculpture, and pointed out some of the excellencies of the Laocoon and Apollo Belvidere. He addressed himself to the tyro, who must only by patient toil expect to gain the true art feeling. He instanced Dr. Arnold, who only on his 3rd journey to Italy, writes "He was beginning to *feel* the Apollo."

He then exemplified different ways of looking at art. The matter-of-fact-man, the trifler, the artist, and the poet, quoting a passage of Byron to the point. To the man that knows nothing, you can teach nothing; and no one who spends life in mere pounds, shillings, and pence, or in idle and profitless frivolity, can attain the artist's or the poet's satisfaction in regarding works of arts. He then branched off to busts, and the way to regard them—historically, actually—as regarded the characters or the workmanship itself. He dwelt upon the anatomical,

phrenologic, and physionomic character, and stated that the gladiator form still was to be found in the mere military hero of to-day; while the elegant but licentious Alcibiades might still find his type in the busts of some of her Majesty's household troops. There was a compliment also to the female sex, and reference was made to the times of Antoninus Pius and Marcus Aurelius, as the periods most glorious to humanity except that of Queen Victoria.

Painting there was no time to touch upon, but an etching was produced to show the meaning of Cardinal Wiseman, as to what he wished to exhibit to the poorer classes—being the Seven Joys of the Virgin, and also some of Herring and Remington's prints for school ornament.

Allusion was then made to the opportunities of seeing art-works in England being much increased of late, and that therefore education in art should be presevered in. He hoped that some friends of art would introduce the works on art criticism of Germany, Italy, and France, by translation, and disseminate such authors as Felix Summerley, Mrs. Jameson, Sir Charles Eastlake, and the lectures of Royal Academicians, and that casts from Brucciani, and prints from Herring and Remington, from Williams and Norgate, and from Varty and Scott, would be introduced to schools, which the scholars might be encouraged to purchase by subscription amongst themselves.

Art was necessary to understand the beauties of Nature.

He proposed also the establishment of professorships of fine art in the universities, which might alter the amusements of certain classes of society, and elevate them. And as the senators of England were educated there, it might be that thus they would imbibe a love for art; and that thus picture galleries. and porticos would be erected for the people's use, or at least that the view of St. Paul's, the most magnificent in the world, would not be lost for the expense of a quarter acre of ground; or the Thames be without planted terraces, on which frequent multitudes of her children might love to pay a grateful homage to its pure and limpid waters, lightened by the smokeless blue of a glorious unclouded sky.

He showed what had been done in Paris by one man might be at least attempted by a body of men, united for the purpose, and proposed a society which should take this for its special object—the cultivation of public taste, to which all classes should be admitted, and which would be a great power to bless and teach mankind.

The hands of ministers proposing public good would be thus strengthened, and the education of artists elevated. There was no such society at present. The Royal Academy and the Institute of British Architects were professional. They were the small chapels, as it were, of art worship. This society would be one vast cathedral, which would include the whole human race.

The lecture concluded with apologies for its imperfection, and with thanks for the sympathy which had been manifested by those present in a labour which was felt to be of importance.

SATURDAY, AUGUST 26th, at 7 p.m.

HOW TO TEACH ECONOMIC SCIENCE IN OUR ORDINARY SCHOOLS; ILLUSTRATED. BY W. A. SHIELDS (PECKHAM BIRKBECK SCHOOL).

The lecturer practically illustrated the mode of conveying instruction of this kind to a class, and showed that it might be so put before children as to render it of the highest interest to them. A discussion ensued at the end of the lesson, in which the chairman, Mr. H. Chester, the Rev. J. S. Howson, Mr. Roberts, Mr. Gover, and others, took part. The importance of teaching this subject was generally admitted, and it was asserted by several speakers that it already formed part of the instruction in many schools, National, British and Foreign, and others, whilst some declared that if this branch of teaching were introduced others must be omitted. The general feeling, however, of the meeting appeared to be in favour of its forming part of the school course, though individuals differed as to the mode in which the instruction should be given.

MONDAY, AUGUST 28th, at 5 p.m.

The Secretary regrets that Mr. Harry Chester has not been able to furnish an abstract of his lecture for this week's number, but trusts he will be able to do so next week.

TUESDAY, AUGUST 29th, at 8 p.m.

ON AGRICULTURAL INSTRUCTION IN PARISH SCHOOLS. BY J. C. MORTON.

Mr. Morton commenced by stating that the policy of the thing was to be defended by the same argument as that which justified technical and professional education of any other kind. The possibility of it was limited by the humble means within reach of the teachers of such schools, and by the generally early age at which the labour of children in the fields becomes valuable enough to induce their parents to remove them. The propriety of attempting the agricultural instruction of children in country districts depended on the value of intelligence in agricultural labourers as in all other working men, both to themselves and to their employers. At present, boys in the first years of their service are "more plague than profit," the farmer having then to do the work of education for them imperfectly, which might have been better done by the teacher. The ignorance of grown up labourers is often the limit to the successful progress of the farmer. A man who has farmed successfully in Scotland comes south and fails, "because of our climate," it is said, and "our Enlish clays," neither of which is compatible with Scottish management. Yes, but often and in great degree, because he has not the same machinery here that he could command there; and it is not the implements but the men that are referred to. The more intelligent labourers whose services he could have in Scotland, are, as it were, "self-acting tools" needing but to be "set" correctly at first, and then going through the work correctly to the end. Exchange them for ignorant and uneducated men, and you cannot be sure either that your instructions are understood at first or will be attended to, longer than your superintendence is continued. Lastly, the education of labourers is desirable for its reflex influence on that of farmers, and agricultural ignorance attacked in the van by such institutions as the Royal Agricultural College of Cirencester, and the main body, it is to be hoped, by schools urged on by Lord Ebrington's scheme of district examinations, under the superintendence of the Society of Arts, will be all the more effectually routed if also attacked in the rear and from below by the efficient education of the labouring classes.

The only objections, then, that can be offered to the policy of attempting this must come from those who deny its possibility; and to the consideration of that, the rest of the lecture was devoted. The case of a teacher in a country district was supposed, and his means both for self-instruction and for communicating instruction were enumerated. He had frinds among the farmers—he had the school-garden, he had a few simple pieces of apparatus—he had the aspects of nature all around him, varying with season, soil, and skill—and lastly, he had his books. The works named were Johnston's "Agricultural Chemistry and Geology," Low's "Elements of Practical Agriculture," Stephens's "Book of the Farm," access to which might be had in some neighbouring library—and then for class books there were "The Farmer," by G. Nicholls; Richardson's Shilling Rural Hand-books, "Blacker on Small Farms," &c. The instruction of the teachers was, of course, the main difficulty. This must be done by properly qualified instructors in our normal schools, as is being done in the normal schools at Edin-

burgh and Glasgow, where men trained at Glasnevin College are employed. Letters were read on this subject from Dr. Kirkpatrick, of Glasnevin, D. Milne Horn, Esq., of Coldstream, and J. Gordon, Esq., Secretary to the Committee on Education of the General Assembly of the Church of Scotland. Then, supposing a qualified teacher, the means of instructing others at his command were discussed. Specimen lessons were recited in the main truths of agricultural chemistry, showing how doctrines in the theory and facts in the practice of agriculture were capable of satisfactory, simple, and even amusing illustration, without the employment of a scientific nomenclature, or the use of any other than commonplace and familiar instances and terms. The uses of the garden in agricultural instruction were proved both by testimony and experience. Dr. Daubeny's illustrations of the exhausting power of plants, in his lecture before the Royal Agricultural Soci.ty of England, were taken from *garden* plots. Tull's argument was built originally upon observation of *garden* rows and single plants. The most complete and satisfactory inquiry into the relative values of our Grasses was conducted by Sinclair in the Woburn *Gardens*. One of the most perfect inquiries into the relative values of our Wheats is reported in the first volume of the Journal of the English Agricultural Society as having been carried out in a *garden* in Gloucestershire. Experiments on manures in *gardens* are perfectly satisfactory. What can be more so than the valuable annual report of a *garden* experience given for many years in the *Agricultural Gazette* by the Hon. and Rev. L. V. Harcourt. Modes of culture, then, methods of manuring, rotations of cropping, and the merits of the various crops—all these particulars, which among them pretty nearly complete the circle of the mere cultivator's experience—are capable of perfect illustration in a garden. And how perfectly the *rationale* of many an operation can be thus presented to both mind and eye can be easily imagined. You may talk to a boy by the hour on the advantage of stirring the soil and of deep cultivation, inasmuch as it admits the air more perfectly throughout the substance of the soil, and thereby facilitates the chemical processes by which the soil and its contents are fitted as the food of plants; but no quantity of merely verbal instruction will equal in its force, either upon the understanding or memory, the lesson on that subject which that same boy would receive if, after having dug a hole in the hardened ground, he were told to put into it all the earth he had just taken out of it. *The heap remaining over* which he could not return to its place would represent more distinctly to him the bulk of additional air thus introduced into the soil by its disturbance than any argument unsupported by this simple experiment could do.

The uses of the garden in furnishing practice in the use of tools were proved by the experience of lchools in the Highlands and in Ireland. Its uses in adding to the means of the school, or the emoluments of the teacher, were prove by reference to the experience of Mrs. D. Gilbert's schools in Sussex, by the experience of Mr. Batson, late of Kynaston House, in Herefordshire, who lodged maintained, and instructed boys upon his farm, being repaid by their labour; and by the experience of reformatory schools, the one especially referred to being that at Hardwicke, near Gloucester, now for several years maintained in operation by the wise and painstaking benevolence of Mr. Bengough and Mr. Baker, two magistrates of Gloucestershire.

Lastly, the fact that agricultural instruction *can* be given without endangering the efficiency of the ordinary literary instruction, was proved by the testimony of such men as Dr. Kirkpatrick and Mr. Gordon. The policy of giving the latter an agricultural turn by the use of *agricultural* reading books and *agricultural* arithmetic books in our rural schools was adverted to. The value of evening schools for adults, as meeting the deficiences arising from a too early removal of children to work, and as in some degree a successful rival to the public-house, was insisted on, and Mr. Morton concluded by quoting a saying of the Dean of Hereford, "I am perfectly convinced that many well-meaning efforts in the education of children have not been attended with the success expected from them, entirely owing to their leaving out all instruction relating to the occupations by which they are in after-life to earn their bread."

PARIS EXHIBITION OF 1855.

Visits of Artisans.

The Committee appointed by the Council to take charge of this subject are actively engaged in collecting the necessary information, and are in communication with parties in Paris as to the providing due accommodation in the way of Lodgings and Board on moderate terms for intending visitors. The Committee have every reason to believe that they will be able to obtain such accommodation as will be perfectly satisfactory, and at such a cost as will bring it within the means of the many.

The Committee expects to be able very shortly to complete all the arrangements, and will at once proceed to publish them in detail, with the total cost, including that of transit to and fro.

The Woburn Literary, Scientific, and Mechanics' Institution have appointed a Committee for organising measures by which artisans may at once begin to make weekly deposits to provide a fund for enabling them to visit Paris during the Exhibition of 1855.

The Committee have issued the following circular, with the accompanying rules:

The Committee of the Woburn Literary, Scientific and Mechanics' Institution, fully coinciding with the opinion expressed by the Council of the Society of Arts, respecting the advantages likely to accrue from the visits of the working men of this country to the Paris Exhibition next year, have made arrangements for receiving from such as may be so disposed to go, small weekly deposits for the necessary expenditure, and beg herewith to forward you a copy of rules adopted for the occasion.

At the same time the Committee feel that there will be many who it is very desirable should visit the Exhibition, who are not in a position to provide the whole of the funds necessary for the purpose. The Committee have therefore decided on appropriating five pounds out of the surplus fund arising out of the late Exhibition, in aid of a fund for assisting artisans and apprentices not earning more that 21s. per week, in the payment of their travelling expenses.

The Committee earnestly solicit your kind assistance in aid of this fund. Donations will be received by any of the Committee.

RULES.

1. That subscriptions be paid into the hands of any of the Committee weekly, at such rate as the subscriber may think proper; about one shilling per week for twelve months is the lowest estimate of what will be required.
2. That each subscriber take a receipt in a book to be provided for that purpose, on paying his subscription.
3. That the collectors pay the amounts they have received into the hands of the Secretary on the Friday evening preceding the first Saturday in every month.
4. That the Secretary pay the amount he shall have received into the savings bank at Woburn on the first Saturday in every month.
5. That the Committee meet on the Monday following the first Saturday in every month, at eight o'clock in the evening, to examine the bank-book, receive the report of the collectors, and transact any other business that may be requisite.
6. That any subscriber may attend such meeting, but not vote.
7. That any subscriber may at any time withdraw the

amount deposited, upon giving one week's notice to the Secretary.

8. That when the time arrives for visiting Paris, the subscribers shall have the option of withdrawing the amount subscribed, or of uniting to go together, under the arrangements to be made by the Committee.

9. That subscribers intending to visit Paris under such arrangements, shall pay into the hands of the Secretary before starting such amount as may be required in addition to their subscriptions, to cover their travelling expenses to and from Paris..

10. That the Committee shall endeavour to procure donations to a fund for paying the necessary incidental expenses, and for assisting artisans and apprentices not earning more than 21s. per week, in the payment of their travelling expenses.

LITERARY AND SCIENTIFIC INSTITUTIONS ACT, 1854.

Applications having been made to the Secretary for information respecting the Provisions of the Act 17 and 18 Vict., c. 112, which in the shape of a Bill promoted by the Society had been brought before the Conference in July last, it has been thought more useful to publish it at full length than to give a mere summary of it. The Act received the Royal Assent on the 11th August.

ANNO DECIMO SEPTIMO AND DECIMO OCTAVO.

VICTORIÆ REGINÆ.

CAP. CXII.

An Act to afford greater facilities for the establishment of Institutions for the Promotion of Literature and Science and the Fine Arts, and to provide for their better regulation.

Whereas it is expedient that greater facilities should be afforded for procuring and settling sites and buildings in trust for Institutions established for the promotion of Literature, Science, or the Fine Arts, or for the Diffusion of useful knowledge, and that other provisions should be made for improving the legal condition of such Institutions: Be it therefore enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords spiritual and temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:

I. Any person in *England*, *Wales*, or *Ireland*, being seised in fee simple, fee tail, or for life of and in any manor or lands of freehold, copyhold, or customary tenure, and having the present beneficial interest therein, may grant, convey, or enfranchise, by way of gift, sale, or exchange, in fee simple or for a term of years, any quantity not exceeding one acre of such land, whether built upon or not, as a site for any such Institution as hereinafter described; provided, that no such grant made by any person seised only for life of and in any such manor or lands shall be valid, unless, if there be any person next entitled to the same in remainder, in fee simple or fee tail, and if such person be legally competent, he shall be a party to and join in such grant; provided also, that where any portion of waste or commonable land shall be gratuitously conveyed by any lord of a manor for any such purpose as aforesaid, the rights of all commoners and others having interest of a like nature in the said land shall be barred and divested by such conveyance.

II. The Chancellor and Council of her Majesty's Duchy of *Lancaster* for the time being, by any deed or writing under the hand and seal of the Chancellor of the said duchy for the time being, attested by the clerk of the council of the said duchy for the time being, for and in the name of Her Majesty, her heirs and successors, may, if they see fit, grant, convey, or enfranchise, to or in favour of such Institution, any land forming part of the possessions of the said duchy, not exceeding in the whole one acre in any one parish, upon such terms and conditions as to the said Chancellor and Council shall seem meet; and where any sum or sums of money shall be paid for the purchase or consideration for such land so to be granted, conveyed, or enfranchised as aforesaid, the same shall be paid into the hands of the Receiver-General for the time being of the said duchy, or his deputy, and shall be by him paid, applied, and disposed of according to the provisions and regulations contained in an act of the forty-eighth year of the reign of his late Majesty King *George* the Third, chapter seventy-three, or any other act or acts now in force for that purpose.

III. Any three or more of the Principal Officers of the duchy of *Cornwall*, under the authority of a warrant issued for that purpose under the hands of any three or more of the Special Commissioners for the time being for managing the affairs of the duchy of *Cornwall*, or under the hands of any three or more of the persons who may hereafter for the time being have the immediate management of the said duchy, if the said duchy shall be then vested in the Crown, or if the said duchy shall be then vested in a Duke of *Cornwall*, then under the hands of any three or more of the Principal Officers of the said duchy, or under the hands of any three or more of the persons for the time being having the immediate management of the said duchy, may, if they think fit, and are so authorized, by deed grant, convey, or enfranchise to or in favour of any existing or intended Institution any land forming part of the possessions of the said Duchy of *Cornwall*, not exceeding in the whole one acre in any one parish, upon such terms and conditions as to the said Special Commissioners or Principal Officers, or such other Person as aforesaid, shall seem meet.

IV. Provided, that upon any land so granted by way of gift as aforesaid, or any part thereof, ceasing to be used for the purposes of the Institution, the same shall thereupon immediately revert to and become again a portion of the estate or manor or possessions of the Duchy, as the case may be, to all intents and purposes as fully as if this Act or any such grant as aforesaid had not been passed or made, except that where the Institution shall be removed to another site the land not originally part of the possessions of either of the Duchies aforesaid may be exchanged or sold for the benefit of the said Institution, and the money received for equality of exchange or on the sale may be applied towards the erection or establishment of the Institution upon the new site.

V. Where any person shall be equitably entitled to any manor or land, but the legal estate therein shall be vested in some trustee or trustees, it shall be sufficient for such person to convey the land proposed to be granted for the purpose of this Act, without the trustee or trustees being party to the conveyance thereof; and where it is deemed expedient to purchase for the purpose aforesaid any land belonging to or vested in any Infant or Lunatic, such land may be conveyed by the Guardian or Curator of such infant or the Committee of such lunatic respectively, who may receive the purchase money for the same, and give valid and sufficient discharges to the party paying such purchase money, who shall not be required to see to the application thereof.

VI. Any Corporation, Ecclesiastical or Lay, whether sole or aggregate, and any Officers, Justices of the Peace, Trustees, or Commissioners, holding land for public, ecclesiastical, parochial, charitable, or other purposes or objects, may, subject to the provisions hereinafter mentioned, grant, convey, or enfranchise for the purpose of this Act such quantity of land as aforesaid, in any manner vested in such Corporation Officers, Justices, Trustees, or Commissioners; provided, that no Ecclesiastical Corporation Sole, being below the dignity of a Bishop, shall be authorized to make such grant without the consent in writing of the Bishop of the diocese to whose jurisdiction the said ecclesiastical corporation shall be subject; provided also, that no parochial property shall be granted for such purpose without the consent of a majority of the ratepayers and owners of property in the parish to which

the same belongs, assembled at a meeting to be convened according to the mode pointed out in the Act passed in the sixth year of the reign of his late Majesty, intituled *An Act to facilitate the conveyance of Workhouses and other property of parishes and of Incorporations or Unions of parishes in* England *and* Wales, and without the consent of the Poor law Board, to be testified by their seal beng affixed to the deed of conveyance, and of the Guardians of the poor of the union within which the said parish may be comprised, or of the Guardians of the poor of the said parish where the administration of the relief of the poor therein shall be subject to a Board of Guardians, testified by the Guardians of such union or parish being the parties to convey the same; and that no property held upon trust for charitable purposes shall be granted without the consent of the Charity Commissioners.

VII. Where any Officers, Trustees, or Commissioners, other than parochial trustees, shall make any such grant, it shall be sufficient if a majority or quorum authorized to act of such officers, trustees, or commissioners, assembled at a meeting duly convened, shall assent to such grant, and shall execute the deed of conveyance, although they shall not constitute a majority of the actual body of such officers, trustees, or commissioners; and the Justices of the Peace may give their consent to the making any grant of land or premises belonging to any County, Riding, or Division by vote at their General Quarter Sessions, and may direct the same to be made in the manner directed to be pursued on the sale of the Sites of Gaols by an Act passed in the seventh year of the reign of his late Majesty *George* the Fourth, intituled *An Act to authorise the disposal of unnecessary prisons in* England.

VIII. If part only of any land held in fee subject to a perpetual rent, or comprised in a lease for a term of years unexpired, shall be conveyed or agreed to be conveyed for the purpose of this Act, the rent payable in respect of the lands subject thereto, and any fine certain or fixed sum of money to be paid upon any renewals of the lease, or either of such payments, may be apportioned between the part of the said land so conveyed or agreed to be conveyed and the residue thereof, and such apportionment may be settled by agreement between the parties following; that is to say, the person for the time being entitled to the rent where the land is held in fee or the lessor or other the owner subject to such lease of the lands comprised therein, the person entitled to the fee subject to the rent, or the lessee or other party entitled to the land by virtue of such lease or any assignment thereof for the residue of the term thereby created, and the party to whom such conveyance as aforesaid for the purpose of this Act is made or agreed to be made; and when such apportionment shall so be made it shall be binding on all under-lessees and other persons and corporations whatsoever, whether parties to the said agreement or not.

IX. In case of any such Apportionment as aforesaid, and after the lands so conveyed or agreed to be conveyed as aforesaid shall have been conveyed, the person entitled to the fee or other estate in the lands subject to the rent, the lessee, and all parties entitled under him to the lands not included in such conveyance, shall, as to all future accruing rent, and all future fines certain or fixed sums of money to be paid upon renewals, be liable only to so much of the rent or of such fines or sums of money as shall be apportioned in respect of such last-mentioned lands; and the party entitled to the rent charged or reserved shall have all the same rights and remedies for the recovery of such portion of the rent as last aforesaid as previously to such apportionment he had for the recovery of the whole rent charged or reserved; and all the Covenants, Conditions, and Agreements, except as to the amount of rent to be paid, and of the fines or sums of money to be paid upon Renewals, in case of any apportionment of the same respectively, shall remain in force with regard to that part of the land which shall not be so conveyed as aforesaid, in the same manner as they would have done in case such part only of the land had been subject to the rent or included in the lease.

X. Any Person or Corporation may grant any number of sites for distinct and separate Institutions, although the aggregate quantity of land thereby granted by such Person or Corporation shall exceed the extent of one acre, provided that the site of each Institution do not exceed that extent.

XI. Where the Institution shall not be incorporated, the grant of any land for the purpose of such Institution, whether taking effect under the authority of this Act, or any other authority, may be made to any Corporation sole or Aggregate, or to several Corporations Sole, or to any Trustees whatsoever, to be held by such Corporation or Corporations or Trustees for the purpose of such Institution.

XII. The provisions of the Act of the fourteenth *Victoria*, chapter twenty-eight, shall be applicable to the conveyances of lands in *England*, *Wales*, and *Ireland*, made or to be made to Trustees, not being Corporations, for the purposes of such Institutions.

XIII. All grants, conveyances, and assurances of any Site for an Institution under the provisions of this Act may be made according to the form following, or as near thereto as the circumstances of the case will admit; (that is to say,)

I, *or* we, [*or the corporate title of a corporation*,] under the authority of an Act passed in the year of the reign of her Majesty Queen Victoria, intituled do hereby freely and voluntarily, and without any valuable consideration [*or* do in consideration of the sum of to me, *or* us, *or* the said paid], grant and convey [*add, if necessary*, enfranchise] to all [*description of the premises*] and all [my, *or* our, *or* the right, title, and interest of the to and in the same and every part thereof, to hold unto and to the use of the said Corporation and their Successors, *or* of the said and his *or* their [heirs *or* executors *or* administrators *or* successors], for the purposes of the said Act, and to be applied as a site for and for no other purpose whatever; such to be under the management and control of [*set forth the mode in which and the persons by whom the Institution is to be managed and directed; in cases where the land is purchased, exchanged, or demised, usual covenants or obligations for title may be added*]. In witness whereof the conveying and other parties have hereunto set their hands and seals, [*or* seals *only, as the case may be*,] this day of signed, sealed, and delivered by the said in the presence of of And no bargain and sale or livery of seisin shall be requisite in any conveyance intended to take effect under the provisions of this Act, nor more than one witness to the execution by the conveying party.

XIV. Any deed executed for the purposes of any Institution to which this Act applies, without any valuable consideration, shall continue valid, if otherwise lawful, although the donor or grantor shall die within twelve calendar months from the execution thereof.

XV. Where land of copyhold or customary tenure shall have been or shall be granted for the purpose of such Institution, the conveyance of the same by any deed wherein the Copyholder shall grant and convey his Interest, and the Lord shall also grant and convey his Interest, shall be deemed to be valid and sufficient to vest the Freehold interest in the grantee or grantees thereof without any surrender or admittance or enrolment in the lord's court, but the fees (if any) payable bv the Custom of the Manor upon Enfranchisement shall be paid to the steward.

XVI. Where any land shall be sold by any Ecclesiastical Corporation Sole for the purpose of this Act, and the purchase money to be paid shall not exceed the sum of Twenty pounds, the same may be retained by the Party conveying for his own benefit, but when it shall exceed the sum of twenty pounds it shall be applied for the benefit of the said Corporation in such manner as the Bishop in whose diocese such land shall be situated shall,

by writing under his hand, to be registered in the Registry of his Diocese, direct and appoint; but no person purchasing such land for the purpose aforesaid shall be required to see to the due application of any such purchase money.

XVII. In cases not otherwise provided for in this Act, the clauses sixty-nine, seventy, seventy-one, seventy-two, seventy-three, seventy-four, and seventy-eight of the Lands Clauses Consolidation Act, one thousand eight hundred and forty-five, being the eighth and ninth *Victoria*, chapter eighteen, shall apply in respect of the application of the purchase money of all sites purchased from Incapacitated Persons, Corporations, and Trustees hereby empowered to sell, other than the Chancellor and Council of the Duchy of *Lancaster* and the Officers of the Duchy of *Cornwall*.

XVIII. If it shall be deemed advisable to sell any land or building not previously part of the possessions of the Duchy of *Lancaster* or *Cornwall* held in trust for any Institution, or to exchange the same for any other site, the Trustees, in whom the legal estate in the said land or building shall be vested, may, by the direction or with the consent of the Governing Body of the said Institution, if any such there be, sell the said land or building, or part thereof, or exchange the same for other land or building suitable to the purposes of their trust, and receive on any exchange any sum of money by way of effecting an equality, and apply the money arising from such sale or given on such exchange in the purchase of another site, or in the improvement of other premises used or to be used for the purposes of such trust; and such Trustees may, with like direction or consent, let portions of the premises belonging to the Institution not required for the purposes thereof, for such term, and under such covenants or agreements, as shall be deemed by such Governing Body to be expedient, and apply the rents thereof to the benefit of the Institution.

XIX. The Trustees of such Institution who, by reason of their being the legal owner of the building or premises, shall become liable to the payment of any rate, tax, charge, costs, or expenses, shall be indemnified and kept harmless by the Governing Body thereof from the same, and in default of such indemnity shall be entitled to hold the said building or premises and other property vested in them as a security for their reimbursement and indemnification, and, if necessity shall arise, may mortgage or sell the same, or part thereof, free from the trusts of the Institution, and apply the amount obtained by such mortgage or sale to their reimbursement, and the balance (if any) to the benefit of the Institution, subject to the restrictions hereinbefore contained with regard to lands given and lands belonging to the Duchies aforesaid.

XX. Where any Institution shall be incorporated, and have no provision applicable to the Personal Property of such Institution, and in all cases where the Institution shall not be incorporated, the Money, Securities for money, Goods, Chattels, and Personal Effects belonging to the said Institution, and not vested in Trustees, shall be deemed to be vested for the time being in the Governing Body of such Institution, and in all proceedings, civil and criminal, may be described as the Monies, Securities, Goods, Chattels, and effects of the Governing Body of such Institution by their proper title.

XXI. Any Institution incorporated which shall not be entitled to sue and be sued by any Corporate name, and every Institution not incorporated, may sue or be sued in the name of the President, Chairman, Principal Secretary, or, Clerk, as shall be determined by the rules and regulations of the Institution, and, in default of such determination, in the name of such Person as shall be appointed by the Governing Body for the occasion; provided, that it shall be competent for any person having a claim or demand against the Institution to sue the President or Chairman thereof, if, on application to the Governing Body, some other Officer or Person be not nominated to be the defendant.

XXII. No suit or proceeding in any civil court shall abate or discontinue by reason of the person by or against whom such suit or proceedings shall have been brought or continued dying or ceasing to fill the character in the name whereof he shall have sued or been sued, but the same suit or proceeding shall be continued in the name of or against the successor of such person.

XXIII. If a Judgment shall be recovered against the Person or Officer named on behalf of the Institution, such judgment shall not be put in force against the goods, chattels, or lands, or against the Body of such Person or Officer, but against the Property of the Institution, and a writ of revivor shall be issued setting forth the judgment recovered, the fact of the party against whom it shall have been recovered having sued or having been sued, as the case may be, on behalf of the Institution only, and requiring to have the judgment enforced against the Property of the Institution.

XXIV. In any Institution the Governing Body, if not otherwise legally empowered to do so, may at any meeting speecially convened according to its regulations, make any Byelaw for the better governance of the Institution, its Members or Officers, and for the furtherance of its Purpose and Objects, and may impose a reasonable pecuniary penalty for the breach thereof, which penalty, when accrued, may be recovered in any local Court of the District wherein the defendant shall inhabit or the Institution shall be situated, as the Governing Body thereof shall deem expedient: Provided always, that no pecuniary penalty imposed by any byelaw for the breach thereof shall be recoverable unless the byelaw shall have been confirmed by the votes of Three-fifths of the Members present at a Meeting specially convened for the purpose.

XXV. Any Member who may be in arrear of his Subscription, according to the Rules of the Institution, or may be or shall possess himself of or detain any Property of the Institution, in a manner or for a time contrary to such rules, or shall injure or destroy the Property of the Institution, may be sued in the manner herein-before provided, but if the Defendant shall be successful in any Action or other Proceeding at the instance of the Institution, and shall be adjudged to recover his costs, he may elect to proceed to recover the same from the Officer in whose name the suit shall be brought, or from the Institution, and in the latter case shall have Process against the Property of the said Institution in the manner above described.

XXVI. Any member of the Institution who shall steal, purloin, or embezzle the money, securities for money, goods and chattels of the Institution, or wilfully and maliciously, or wilfully and unlawfully, destroy or injure the Property of such Institution, or shall forge any deed, bond, security for money, receipt, or other instrument, whereby the funds of the Institution may be exposed to loss, shall be subject to the same prosecution, and if convicted shall be liable to be punished in like manner, as any person not a member would be subject and liable to in respect to the like offence.

XXVII. Whenever it shall appear to the Governing Body of any Institution (not having a Royal Charter, nor established by nor acting under any Act of Parliament) which has been established for any particular purpose or purposes, that it is advisable to alter, extend, or abridge such purpose, or to amalgamate such Institution, either wholly or partially, with any other Institution or Institutions, such Governing Body may submit the proposition to their members in a written or printed report, and may convene a special meeting for the consideration thereof according to the regulations of the Institution; but no such proposition shall be carried into effect unless such report shall have been delivered or sent by post to every Member ten days previous to the special meeting convened by the Governing Body for the consideration thereof, nor unless such proposition shall have been agreed to by the Votes of three-fifths of the members present at such meeting, and confirmed by the votes of three-fifths of the members present at a second special meeting convened by the Govern-

ing Body at an interval of one month after the former meeting.

XXVIII. If any members of the Institution, being not less than two-fifths in number, consider that the proposition so carried is calculated to prove injurious to the Institution, they may, within three months after the confirmation thereof, make application in writing to the Lords of the Committee of Her Majesty's Privy Council for Trade and Foreign Plantations, who, at their discretion, shall entertain the application, and if, after due inquiry, they shall decide that the proposition is then calculated to prove injurious to the Institution, the same shall not be then carried into effect; but such decision shall not prevent the Members of such Institution from reconsidering the same proposition on a future occasion.

XXIX. Any number not less than Three-fifths of the members of any Institution may determine that it shall be dissolved, and thereupon it shall be dissolved forthwith, or at the time then agreed upon, and all necessary steps shall be taken for the Disposal and Settlement of the Property of the Institution, its Claims and Liabilities, according to the rules of the said Institution applicable thereto, if any, and if not, then as the Governing Body shall find expedient; provided, that in the event of any Dispute arising among the said Governing Body or the members of the Institution the Adjustment of its Affairs shall be referred to the Judge of the County Court of the District in which the principal Building of the Institution shall be situated, and he shall make such order or orders in the matter as he shall deem requisite, or, if he find it necessary, shall direct that proceedings shall be taken in the Court of Chancery for the adjustment of the affairs of the Institution.

XXX. If upon the dissolution of any Institution there shall remain, after the satisfaction of all its Debts and liabilities, any property whatsoever, the same shall not be paid to or distributed among the Members of the said Institution or any of them, but shall be given to some other Institution, to be determined by the Members at the time of the dissolution, or in default thereof by the Judge of the County Court aforesaid; provided, however, that this clause shall not apply to any Institution which shall have been founded or established by the contributions of Shareholders in the nature of a joint stock company

XXXI. For the purposes of this Act, a Member of an Institution shall be a person who, having been admitted therein according to the rules and regulations thereof, shall have paid a subscription, or shall have signed the roll or list of members thereof; but in all proceedings under this Act no person shall be entitled to vote or be counted as a Member whose current subscription shall be in arrear at the time.

XXXII. The Governing Body of the Institution shall be the Council, Directors, Committee, or other Body to whom by Act of Parliament, charter, or the rules and regulations of the Institution, the management of its affairs is entrusted; and if no such body shall have been constituted on the establishment of the Institution, it shall be competent for the Members thereof, upon due notice, to create for itself a Governing Body to act for the Institution thenceforth.

XXXIII. The Act shall apply to every Institution for the time being established for the Promotion of Science, Literature, the Fine Arts, for Adult Instruction, the Diffusion of Useful Knowledge, the Foundation or Maintenance of Libraries or Reading-Rooms for general use among the Members or open to the Public, of Public Museums and Galleries of Paintings and other works of art, collections of natural history, mechanical and philosophical inventions, instruments, or designs; provided that the Royal Institution, and the *London* Institution for the Advancement of Literature and the Diffusion of Useful Knowledge, shall be exempt from the operation of this Act.

XXXIV. The term "parish" shall signify herein any place separately maintaining its own poor

XXXV. In all deeds, documents, proceedings, suits and prosecutions, this Act may be cited and described by the name of "The Literary and Scientific Institutions Act, 1854."

OBSERVATIONS IN FAVOUR OF A DECIMAL COINAGE.*

By Professor De Morgan.

1. The word *decimal* means *of or relating to ten*; if there were a pure English word answering to it, we should have *tennish* or *teniy*.

2. The common way of writing numbers is *decimal*, so called because, in proceeding from right to left, each change of place augments value *tenfold*. Thus, 1111 1, each unit is made to mean ten times as much as the one on the right of it.

3. It is often supposed that the word *decimal* relates only to *fractions*, because we hear much of decimal *fractions*, and little or nothing of decimal *numbers*. And in like manner we often speak of a round table, and seldom of a round apple: because all apples are round, but not all tables. We never use any but decimal numbers; we do use other than decimal fractions.

4. The pound sterling is not divided *decimally*. The first step, division into 20 shillings, is closely related to decimal division, and capable of being converted without loss of the shilling. Let *two* shillings be *one* florin, and then *ten* florins will make a pound. But the division of the shilling into 12 pence is not at all related to decimal division.

5. In the *simple* rules of arithmetic, we practice a pure decimal system, nowhere interrupted by the entrance of any other system: *from column to column we never carry anything but tens*.

6. In what are called the *compound* rules of arithmetic, relating to—pounds, shillings, and pence—miles, yards, and inches—&c., we practice what is in each case a mixture of systems; each in itself more difficult than the pure decimal system, and each rendered still more difficult by admixture with others.

7. Every one who knows anything of arithmetic, to say nothing of those who have been prevented from knowing anything of it by the very thing we are going to mention, is aware of the complexity and tediousness of our existing systems of weights, measures, and coinage. Every one acknowledges that if an educated community had to begin again, all should be decimal, or *in tens*; that is, each larger weight, measure, or coin, should be ten of the next smaller.

8. The advantage of a decimal division, or *perfect and entire exclusion*, in reckoning, *of all subdivision except into tens*, is that the *common* and *fundamental* arithmetic, which is seen in the first rules learnt of addition, substraction, multiplication, and division, is the *only* arithmetic required. Every difference of operation between the simple and compound arithmetic is done away with.

9. All the advantages of a decimal system spring out of this one advantage just named; that is, all the advantages for which we here advocate the introduction of a decimal coinage. Any other advantages which there may be would not of themselves be enough to induce us to desire the change. There will be a great saving of time in business calculations, and a great saving of time in education. No one has attempted to deny the assertion made, that in every hundred hours employed in education *of all kinds*, five at least are thrown away by the complexity of our system of accounts. A decimal coinage would save a great deal of labour for other purposes, and therefore would create a great deal of wealth; it would set free a great deal of time in education, and therefore would create a great deal of intellectual power.

* These observations form the introduction to the proceedings of the Decimal Association.

10. As an instance of the identity of simple and comound arithmetical process, when divisions are solely into *ns*, let one pound sterling be 10 florins, let one florin be n cents, let one cent be 10 mils. Multiply together the umbers 793 and 438, in the common way—

```
   793
   438
  ----
  6344
 2379
3172
------
347334
```

This is all the *operation* required in the following quesns:—

If one yard cost 7 florins, 9 cents, 3 mils, how much do 8 yards cost? *Answer*, £347 3 fl. 3 ct. 4 m.

If £1 make a profit of 7 fl. 9 ct. 3 m., what profit will 3 fl. 8 ct. make? *Answer*. £3 4 fl. 7 ct. 3 m. (and -100ths of a mil, for which there will be no coinage).

If a bankrupt estate pay 4 fl. 3 ct. 8 m. in the pound, at dividend will be paid on a debt of £79 3 fl.? *Aner*, £34 7 fl. 3 ct. 3 m. (and 4-10ths of a mil).

It is very obvious that corresponding questions, proposed our existing system, would require many more figures be written down. And more than this, the mental rations, which are not written down in either, are much re difficult in the existing than in the decimal system.

1. Some friends, as they suppose themselves to of a *decimal* system, propose systems which are *entirely* decimal; that is, which do not make divisions into ten. Some want a franc of ten ice and a pound of twenty-five francs; some want continue the division of the shilling into twelve ice of four farthings each. These propositions, as now ught forward, are consequences of the Latin word *imal* never having taken complete root in English. If language would have permitted us, instead of advoing an *entire decimal* system, to speak of an *all-ten* oning, no such equivocation could have been introed. No one would have said—"I am quite for an *ten* system, but I hold that the only *all-ten* system is in which the pound is divided into *twenty-five* francs." one would have said—"I am for an *all-ten* system, I think I prefer the *all-ten* system in which the ling is *twelve* pence." No one, in short, would have —"I agree with those who want the whole, but I only for a part."

2. Those who prefer a *partially* decimal system have ht to their opinion and their argument. But they no right, except the right of fallacy, and the right nfusion of terms, to bring forward their opinion and ment under the name, the associations, and the ority, of the word *decimal*. In answer to them, we say nothing, except that the advantage set forth 8, the complete and total sufficiency of common metic, is lost by *any* departure from a pure decimal oning, how small soever that departure may be. We the pure decimal reckoning first, and the rest ere. Rather than adopt any compromise, we should e to remain as we are until the question is better unood. But we are satisfied that any *partial* decimal m has no chance.

. We do not reckon among the opponents of whom ave just spoken those who would have a perfectly nal system with an imperfect nomenclature. Any who thinks that the pound should be of 10 florins, he florin of 100 mils, advocates a pure decimal syslacking a name for one of the subdivisions. Out of nay arise a question of coinage, and a question of nience of usage, of which we say nothing in a mere ary, for two reasons: First, because the settlement very small importance compared with the acquisif an *entirely* decimal reckoning. Secondly, because one of the questions which must be left to usage

14. The two points* on which we insist, are—

First, that an entirely decimal system of *accounts* should be introduced, in combination with such alteration of *coinage* as will be best adapted to, and will most certainly be the means of introducing such a system of accounts.

Secondly, that the pound sterling should be, as it now is, the highest and principal unit of account.

15. Money of account is frequently confounded with coinage, and this leads to serious misapprehension.

16. A *money of account* is any money which is used in accounts—any money for which a column is ruled in the books. The items of our present money of account are pounds, shillings, pence, and farthings.

17. A *Coin* is a stamped piece of metal which has, or has with nearness, the value for which it is a legal tender.

18. Money of account may exist without a coin; thus, for a long time there was nothing to represent a pound except a promissory note of the Bank of England, or of a private banker. During part of the sixteenth century, there was nothing, coin or note, to represent either a pound or a shilling, though accounts were kept, as now, in pounds, shillings, and pence.

19. Coins may exist which are not moneys of account; of which we actually have threepenny and fourpenny pieces, sixpenny pieces, florins, half-crowns, crowns, and half-sovereigns.

20. The actual paying and receiving of coinage is a matter the advantages and disadvantages of which are in several particulars unconnected with those of the system of accounts. Our present coins, if not the very best, are still sufficiently well adapted for their purposes of transit from hand to hand. If the sum to be paid could always be named without calculation, no one would care to face the inconvenience of a change for any good which could be got by it.

21. There is a very wide-spread confusion between questions of account and questions of coinage. Those who are more accustomed to think of receipt and payment than of calculation of receipt and payment, argue the coinage question as if it contained the whole matter. The Master of the Mint gave it as his opinion, that twenty years would elapse before the coins which are not well suited to a decimal system (and especially the half-crown) could all be brought home to the Mint. He was supposed by many to be of opinion, that twenty years would elapse before a *decimal system of accounts* could be introduced; whereas he, in common with almost all who have attended to the subject, was in favour of making the transition almost immediately.

22. On the question how the *actual pound sterling* is to be decimalized, there is no dispute. It fortunately happens that the number of farthings is very nearly 1000; being 960, or only four per cent. less than 1000. If the *copper* portion of the coinage, and the silver smaller than sixpence, be lowered 4 per cent., the whole change is made, *so far as accounts are concerned*. The *sixpence*, now so called, will be 25 farthings instead of 24; the shilling 50 farthings instead of 48; the florin 100 farthings instead of 96.

23. Perhaps this may be illustrated, for those who are new to the subject, in the following way:—Suppose that the Mint should issue a silver coin, call it a *cent*, of the value of twopence halfpenny of present money. We should then have

10 farthings make one cent.

* The Commissioners for the standards of length and weight went out of their way to urge these points upon the Chancellor of the Exchequer, in two letters written some weeks before the appointment of the Committee of the House of Commons. Their final report shows that they think the difficulties, even of decimal *weights and measures*, much lessened since they reported in 1841. These Commissioners are the Astronomer-Royal, Lords Rosse and Wrottesley, Dr. Peacock, Sir J. W. Lubbock, Mr. J. G. S. Le Fevre, Rev. R. Sheepshanks, Professor Miller.

10 cents make one florin *and a penny.*
10 florins make one pound.

The pound would now be decimally subdivided, but for the words in *italics*. Let the farthing and cent be lowered four per cent. in value, the shilling and florin being unaltered, and then the words in italics must be erased, and the pound is decimally divided into florins, cents, and farthings.

24. It has been proposed that the depreciated farthing should be called a *mil*. Four mils might be still called a *penny*, probably 25 mils would still be called *sixpence*, and the half-florin, or 50 mils, would still *be* a shilling. In changing money, all that need be remembered is, that the *sixpenny coin* is (nominally) a farthing more than it used to be, the shilling a halfpenny more, the florin a penny more.

25. The coins of account would be pounds, florins, cents, and mils. The shilling coin still remains at its present value, but disappears *from account*, 5 cents or 50 mils taking its place. The penny undergoes an alteration of value, and disappears from account. The penny coin remains in circulation as representing four mils, and 25 pence make a florin (100 mils) instead of 24.

26. Since the change in the copper coinage is the greatest change proposed, the opponents of this change must be those of most note. These opponents contend that the penny is a coin of so much importance to the poorer classes, that it cannot be altered in value, even though the alteration preserve the shilling and the sixpenny coin unaltered, and amount to but four per cent. on smaller coins.

27. The true *decimal* advocates of the unaltered penny propose † that the coins of account shall be the unaltered farthing, a cent of 10 farthings (2½d.), a florin (or some other name) of 10 cents (2s. 1d.), and a pound, again under some other name, of 10 florins, or £1 0s. 10d. present money. The penny, though thrown out of account, remains as a coin of four farthings, as its present value.

28. Against this system we contend that the fixture of the penny at its present value is not a matter of any consequence even to the poorest classes; and that this assertion is fully borne out by evidence. The working classes think of their larger contracts in shillings, and not in pence; and, as to their smaller contracts, it is obvious that no year elapses without greater changes than 4 per cent. taking place in the quantity of almost anything which can be bought under sixpence.

29. Of more importance than the penny, and to all classes, rich and poor, is the *preservation of the shilling, at its present value, and in its present relation to the pound.* The workman who is paid weekly, and the small shopkeeper, would be seriously inconvenienced if they were obliged to think of a new coin, different from the old shilling. All the quotations of prices, which are made in shillings, up to 100 at least, would be disturbed. In the plan we propose, the shilling, though thrown out of *account*, remains unaltered, and may be used, both in thought and in speech, as at present.

It may be noticed that the practice of quoting prices in shillings up to several pounds, is a consequence of the ease with which shillings are reconverted; and this again arises from the close connection of 20 with the decimal number 10. In a complete decimal system, a still wider choice of quotations exists, and under even greater facilities.

30. The greatest difficulty in the way of an alteration in the penny is the adjustment of such things as tolls, postage-stamps, &c. On this point it is only necessary to say that sufficient methods of meeting these acknowledged difficulties were proposed to the committee of the House of Commons, and that no one person whom the adjustments would affect has offered any opposition to the measure, or proposed any amount of proof that the change is of insuperable difficulty.

31. On the other hand, men of politics, of business, and of science, are all but unanimous in thinking that any alteration in the highest coin of account, the *pound sterling*, would be a commercial inconvenience of the most grievous character, not to be thought of except in exchange for some very striking advantage.

32. Even the substitution of the half-sovereign* for the sovereign, which would retain the shilling among the coins of account, has met with the strongest objections, though the rule of conversion would only consist in doubling, so far as the highest coin is concerned.

33. We are satisfied that any tradesman, small or great, who thinks seriously about the change from reckoning in pounds to reckoning in a new coin of the value of £1 0s. 10d. present money, and remembers that he will frequently have to compare old and new transactions, will anticipate a *large* amount of *trouble* and *anxiety*. All we have here to do is to try to prevent this proposal from hurting its betters: we are sure that it will not be carried.

If any one should reply that we ourselves contemplate some alteration in the money of account, we answer, that the tradesman above alluded to will meet but a *small* amount of *trouble* and no *anxiety*. The only change of value is in the broken florin, or on what is over even shillings.

34. The balance of inconvenience between our system and that of the unaltered penny, described in § 27, must be formed from the following comparison:—

We propose a diminution of 4 per cent. in the farthing and the penny, the effect of which is brought round by the introduction of two additional farthings into the shilling: and *shilling and pound remain unaltered.* An amount of inconvenience is granted: but one which we contend will seriously affect no class. The other system proposes an increase of 4⅙ per cent. to the shilling (or whatever the twentieth part of the new pound is called), and an increase of 4⅙ per cent. to the pound. *Both the shilling and the pound are altered.* We contend that a much greater amount of inconvenience is certain, and that it will affect all classes of society.

35. The coin which may be altered in value with the smallest inconvenience, is that the *purchase* of which has been most fluctuating. Those who have been used to buy very different quantities, say of bread, for a penny, have, in effect, been used to pence of different values. The coin which is altered in value at the greatest inconvenience, is that which we may call the coin of *estimation*, the coin in which matters of permanent importance are *thought of*; the coin in which this year is compared with last year. The coin of estimation of the poorer classes is the shilling; of the richer classes, the pound. The system we propose alters neither the shilling nor the pound. The system which preserves the penny at its present value makes new coins in place both of the shilling and the pound.

* The name of a coin is found to be associated rather with its appearance than its value. Thus, in the sixteenth century, the penny was of silver, and the word *penny* suggested a very small silver coin. When the silver *twopence* was coined, it came to be called a *penny of twopence*, and it appears under that name in books of arithmetic.

† Some propose that the penny shall consist of ten new farthings, that tenpence shall make a franc, and that ten francs shall make the highest coin. But this system has a disadvantage of its own, independently of those which it shares with others of the same class. The sum of 8s. 4d. is far too large for a silver coin, and far too small for a gold one. Even the half sovereign, were it the chief gold coin, would have a very expensive wear and tear.

* The bulk of our gold circulation cannot possibly consist of 10-shilling pieces. It is impossible to coin enough of them, in a given time, to meet emergencies: we must stick to the pound —it is a National Institution, ingrained into all our notions, and I hold it impossible to oust it. *The true object of the 10-shilling piece is to break the sovereign and lessen the amount of silver necessary to be kept up.*—Mr. J. Hankey, Jun.: (quoted by Sir J. Herschel,—516.)

36. Something has been said about the difficulties of the decimal point, and the facilities of error which it introduces. No one need use the decimal * point. Those of the present generation who have not been educated in the technical use of decimals may copy the processes they have been accustomed to in every particular of arrangement. Thus any one who chooses may multiply £6 9fl. 4ct. 3m., by 4, as follows:—

£	Fl.	Ct.	M.
6	9	4	3
			4
£27	7	7	2

instead of,

£		Mils.
6·943		6943
4	or,	4
£27·772		27772 Mils.

Any one may use the old forms of arranging calculations, until he begins to see his own way to the new ones. And should he never see it, he will still have the facilities of the decimal reckoning, the advantage of *no carriage except of tens*; and his children will have more.

37. Every difficulty which accompanies the decimal point is, and must be, found in the existing system in a more complicated form. It is true that the great *facility* of decimal operations introduces risks of error: but this is the case with all facilities. Writing numbers in words at length, especially round thousands, millions, &c., is much *safer* than writing them in numerals.

38. We hope and believe that the establishment of a decimal coinage would soon lead to a general demand for a complete decimal system of weights and measures. But few or none advocate the attempt to change the weights and measures at the same time as the coinage.

CERTIFICATES FOR ART.

The first examinations by the Department of Science and Art of candidates for masterships in local schools of art, have just been concluded at Marlborough House. The candidates were examined in geometry, perspective, mechanical drawing, and elementary colouring, having to perform exercises in a limited time; they were also required to produce various works in these subjects, executed during the past year. The following obtained certificates:—

Anderson, H. J.	Lanchenich, J. C.
Arthur, T.	Lyne, R. G.
Baker, W. J.	Muckley, W.
Berkinshaw, S.	Pyne, C. C.
Brooke, A. N.	Rafter, H.
Chevalier, J. W.	Richardson, J. V.
Cole, A.	Ryles, G.
Croome, J. D.	Smeeth, J. F.
Elton, S.	Sturtenant, J.F.
Finnie, J. F.	Swallow, J. C.
Fussell, J. R.	Swinstead, C.
Gill, G.	Thompson, J. C.
Griffiths, W. T.	Tucker, R.
Hagreen, H. B.	Walker, M.
Healey, J.	White, J.
Holmes, T.	Wigzell, M.
Kemp, J.	Yeats, G. P.
Kinnebrook, W. A.	

* We have seen it stated, as an objection to decimals, that a working man was puzzled when he was told that ·01 was the *proper way* of representing one hundredth, and ·001 the same for one thousandth. No wonder. If a person ignorant of decimal *numbers* were told that 22 is the *proper* way of writing *twenty-two*, be would be puzzled to know what had become of two and two make four. The decimal teaching which comes from the opponents of decimal reckoning should be looked at with caution.

LITERARY TASTES OF ARTISANS AND MECHANICS.

A record has been kept at the Marylebone Free Library, in Gloucester-place, New-road, of the books used by the visitors during the last six months; and, in respect to works of established reputation, it forms a faithful and interesting index of the various classes of books desired by those who frequent a free library. With regard to works more recently published, any conclusions on the subject rest on less solid grounds, as the knowledge of the existence of many modern publications very often depends on other considerations than their positive and intrinsic merits; but whatever the statement may or may not prove, it serves, at all events, undeniably to show that artisans and mechanics have a great disposition to read, and that it would be a matter of very great regret if every opportunity were not afforded them to indulge so excellent and praiseworthy an inclination. This Institution affords a good opportunity for obtaining such information. During the short period of its existence, it appears to have received no less than 17,397 visits, and to have issued 18,163 volumes. The following is believed to be an accurate statement of the various deliveries of books which have been chiefly demanded:—

Strickland's Queens of England,67; Boswell's Johnson, 54; Franklin's Memoirs, 34; Chambers' Journal, 475; Chambers' Miscellany, 145; Naval and Military Sketch Book, 144; Fireside Journal, 86; Working Man's Friend, 78; Half-Hours with the Best Authors, 170; Colonies of Australia, 77; Russell's Modern Europe, 50; Thiers's French Revolution, 147; Bancroft's America, 62; Illustrated London News, 698; Thackeray's Pendennis, 156; London Journal, 918; Penny Cyclopædia, 153; Turner's Chemistry, 45; Rudiments of Painting, 56; Lardner's Steam-Engine, 30; Handbook of London, 68; Pickering's Races of Man, 37; Bacon's Essays, 33; Humboldt's Cosmos, 39; Thorpe's Yule Tide Stories, 119; Shipwrecks of the Royal Navy, 101; Valentine Vox, 242; Uncle Tom's Cabin, 147; Collection of Travels, 126; Gulliver's Travels, 42; Southey's English Admirals, 32; McCulloch's Geographical Dictionary, 59; Bourrienne's Napoleon, 150; Lever's Jack Hinton, 128; Lever's Tom Burke, 112; Southey's Nelson, 150; Life of Wellington, 42; Layard's Nineveh, 95; Goldsmith's Animated Nature, 136; Macaulay's History of England, 178; Hume and Smollett's do., 91; Grote's Greece, 137; Goldsmith's do., 40; Milton's Paradise Lost, &c., 49; Byron's Poems, 98; Chaucer's Canterbury Tales, 39; Hood's Poems, 30; Shakspeare's Plays, 152; Old Curiosity Shop, 113; Barnaby Rudge, 155; Bleak House, 291; Pickwick Club, 206; Nicholas Nickleby, 190; Martin Chuzzlewit, 77; Oliver Twist, 225; David Copperfield, 139; Christmas Books, 71; Scott's Ivanhoe, 125; Scott's Waverley, 57; Scott's Pirate, 110; Scott's Rob Roy, 106; Arabian Nights, 561; Don Quixote, 177; Robinson Crusoe, 318; Bulwer's Paul Clifford, 140; Bulwer's Pelham, 115; Bulwer's My Novel, 55; Bulwer's Caxtons, 58; Scott's Talisman, 48.

Home Correspondence.

MR. THWAITES'S CYPHER.

SIR,—The cypher in the Journal is a very old one, and to be found in most of the books; it is not an easy cypher, but it has very often been deciphered under a more difficult form.

The patent rods are not new, I, and I believe, most other decipherers have had them in pasteboard for thirty years. I have them also in box-wood. I have also the same thing in a series of pasteboard circles, moveable round a common centre, each circle having on its circumference the twenty-six letters of the alphabet.

The best form is, perhaps, rings of box-wood placed side by side on a cylinder, and having the twenty-six

letters on the circumference of each. I have also invented alphabets. The great use of the rods, &c., is to save time in deciphering.

You will, most probably, recognise the cypher if put into another form.

In the subjoined table the key of the cypher is j u b u w h q f x:

Mr. Thwaites's j u b u w h q f x j u b u w h q f x j—Key.
Cypher . . . R B B P A O Q I X W C O N A Y L N B F
I h a v e h a d a n i n t e r v i e w—Trans.

	j	u	b	u	w	h	q	f	x
A	r	g	z	g	e	t	k	v	d
B	s	h	a	h	f	u	l	w	e
C	t	i	b	i	g	v	m	x	f
D	u	j	c	j	h	w	n	y	g
E	v	k	d	k	i	x	o	z	h
F	w	l	e	l	j	y	p	a	i
G	x	m	f	m	k	z	q	b	j
H	y	n	g	n	l	a	r	c	k
I	z	o	h	o	m	b	s	d	l
J	a	p	i	p	n	c	t	e	m
K	b	q	j	q	o	d	u	f	n
L	c	r	k	r	p	e	v	g	o
M	d	s	l	s	q	f	w	h	p
N	e	t	m	t	r	g	x	i	q
O	f	u	n	u	s	h	y	j	r
P	g	v	o	v	t	i	z	k	s
Q	h	w	p	w	u	j	a	l	t
R	i	x	q	x	v	k	b	m	u
S	j	y	r	y	w	l	c	n	v
T	k	z	s	z	x	m	d	o	w
U	l	a	t	a	y	n	e	p	x
V	m	b	u	b	z	o	f	q	y
W	n	c	v	c	a	p	g	r	z
X	o	d	w	d	b	q	h	s	a
Y	p	e	x	e	c	r	i	t	b
Z	q	f	y	f	d	s	j	u	c

The letter in the cell of the first vertical column j opposite to R is i
Ditto u B is h
Ditto b B is a
Ditto u P is v
Ditto w A is e; and so on.

In cyphers the smaller the number of words the longer the time required for detection.

If the words are not separated, or falsely separated, a longer time is necessary.

It may be laid down as a principle that it is never worth the trouble of trying any inscrutable cypher unless its author has himself *deciphered* some very *difficult* cypher.

C.

FIRE-PROOF BUILDINGS.

Sir,—Much as the conflagration at the Messrs. Cubitts' manufactory is to be deplored, regret for the calamity should not be allowed to veil the lessons it affords. Parts of the structure destroyed are what are called fire-proof, and in which iron was introduced, but, it appears without sufficient attention to the expansibility of that metal by heat; the consequence is said to be that the fire-proof structures have had their brick walls destructively shaken by the expansion of the red-hot iron. It is not, however, an *unusual* degree of heat only that disrupts brick work when in connection with iron, for the walls of the ropery erected at Devonport in 1813, were materially damaged by the expansion of its iron gutters by solar heat alone. The building was 120 fathoms long, yet the gutters were in one continuous length, without a single expansion joint in their whole course; now the difference between the temperature of summer and winter causes iron to contract or expand about the 70th part of an inch in every yard of length, consequently in the whole length of that gutter an expansion or contraction of between three and four inches. This was at the time represented to those who had the direction of the work, but was disregarded; the consequence was that during the first winter a vast number of the gutter joints leaked, and in the summer following the walls were so much disturbed as to have called for an official report upon them. In great works, such as the Britannia Bridge, expansion is duly provided for, and doubtless should be in all structures wherein metals form a component part.

Another lesson is afforded by the conflagration at the Messrs. Cubitts'. A large quantity of turpentine and other highly inflammable stores were there kept in *cellars*; they escaped destruction, though within a few feet of an immense mass of burning buildings. This proves the expediency of keeping such stores in *underground* receptacles, such as, for instance, the arched cellars over the reservoir in Portsmouth dock-yard, a work proposed by the Inspector General of Naval Works, 25th November 1798, and forthwith carried into execution. The following observation, in his official letter, are equally applicable to private undertakings where goods of the same nature are concerned. He said: "There are purposes to which this storehouse room seems applicable with very peculiar advantages:—pitch, tar, rosin, tallow, and other such inflammable stores, have, generally speaking, been stored in situations where they are much exposed to danger from fire, and where means are altogether wanting for extinguishing it; whereas if deposited in these receptacles, besides being better protected from fire elsewhere, the whole might be laid under water in a few minutes, and again when the danger should be over, the water with equal ease be run off into the reservoir." These cellars have been used, some as storehouses, others for workshops, one of them for seasoning timber by artificial means; but they were dried and ventilated by pipes leading from each cellar to a trunk which furnished air to the steam-engine fire.

Had the inflammable stores lately consumed by fire in the eastern part of the town been kept below instead of above ground, they might easily have been submerged, and thus property of considerable value have been preserved: and it may be added that wharf walls in general are particularly suitable to the construction of storehouses for highly inflammable stores, and even for such manufactories as those for lucifer matches.

The loss sustained by the Messrs. Cubitt is not the only one to be lamented as consequent on the sad disaster, for much suffering has ensued to their operatives from the destruction of their tools, as is frequently the case in similar disasters. The value of such tools, it is true, is comparatively small, yet bears a large proportion to the men's earnings; they could not have insured property so easily removed as a workman's tools, as no insurance company could afford to ascertain their constant existence. But might not this difficulty be obviated?

Surely in all great establishments for working wood or metals, the operatives are mostly the same individuals, and the tools they use are well known to the foremen of the respective shops; supposing, therefore, that in the instance of constant workmen the master were to insure their tools collectively, under the head of "Operatives Tools." This might be at the expense as well as at the option of each man; perhaps it might cost him a shilling or two a year. Were such a project to be adopted, possibly each operative might be required to furnish a list of his own tools, and the foreman to look them over from time to time, so that the master might not insure for more than the aggregate value of his men's tools. A wholesale price list would easily ascertain the cost of the tools, and should they be burnt they might be replaced at that price. Other petty regulations might be necessary, such as that no insured tool should be removed from the master's premises; but in every well-ordered establishment suitable expedients would be easily devised and instituted.

S. M. BENTHAM.

ORDNANCE.

SIR,—It is a very pleasant thing to behold the loving diligence wherewith Lady Bentham continues to render justice to the memory of one of our departed worthies, carefully guarding the laurels he wore, and storing them up away from the appropriation of meaner brows. Had all our great men left behind them so conscientious and devoted a keeper of their archives how well had their memories been preserved, how much better than in the keeping of literary hacks, seeking only to prey upon "their remains."

It is remarkable how closely resembling each other in their philosophic modes of thinking were the two brothers, one in ethics, the other in physics. One I knew to be in his daily life the simplest-minded man breathing; probably the other was so also, for it is the attribute of great men to be simple. It is the pretender only who covers his inefficiencies with a gaudy garb.

In the article "On Mounting Ordnance on the Principle of Non-Recoil," there occurs these words—"On his (General Bentham's) return home, in 1807, he found that the non-recoil system had been entirely discontinued, but never could learn on what ground it had been abandoned."

In the absence of information we may imagine many—official jealousy, or bad mechanical arrangement, or bad structure of vessels, or many others. But let us begin at the beginning.

In throwing a shot from a piece of ordnance, powder is flashed into elastic gas, exerting its force in all directions, but acting in the direction of the least resistance, viz., the shot, which has for its ultimate fulcrum the breech of the gun. In proportion to the immovability of the breech will be the force exerted on the shot. If the gun runs on wheels, moving with little friction, the elastic force of the explosion will drive the gun back with a force proportioned to the lightness of the gun and the facility of moving. In other words, if the inertia of the gun were the same as that of the shot, the gun would be a projectile at the one end, while the shot was a projectile at the other. To make it more clear, let us suppose a heavy cylinder, truly bored, of one diameter, open at both ends, and with a touch-hole in the middle. A given quantity of powder being placed in the centre, beneath the touch-hole, and a shot placed on either side in contact, rammed with equal care, as a piston fits a cylinder, the result should be, that in firing the powder—the cylinder being placed horizontally, in an open space—the shot would fly exactly the same distance, and the cylinder remain in quietude. If the cylinder were bored of two different diameters, and loaded with powder and shot of different diameters, the largest bore would probably tilt upwards, as a pistol does if not firmly held, but the large shot would fly farthest.

Other things being equal, the heavier the gun, *i.e.*, the denser and more massive the metal, the greater will be its inertia, and the greater the effect of the shot, as well as the correctness of the line of flight. Truth of flight and distance of range of a rifle-ball depend upon the weight of the rifle barrel, amongst other things I have not now time to specify. If a rifle barrel be sufficiently heavy, it might be laid on a bench of turf and discharged unheld, without moving. A light fowling-piece kicks; a well-made heavy rifle does not. If a gun-barrel or a piece of ordnance be too light, they may be helped, one by a heavy stock, the other by a heavy carriage. An English fowling-piece has a stock with a thick butt; an American rifle has a very thin butt, with a very hollow curve to fit the hollow of the arm or the shoulder. The fowling-piece, if not held close to the shoulder, so as to become a part of the body, flies back or kicks; the rifle lies quiet; therefore light ordnance, as described by General Bentham, may recoil and kick more than heavy ordnance.

But there are circumstances in which it is needful to permit recoil, or there would be destruction. If a recoiling gun on a land-battery were held fast it might break away its fastenings. When a revolving gun is suddenly brought up by breechings of rope the sudden check to the momentum is very severe, and we may imagine that on shipboard it may involve much trouble, and virtually it will diminish the effect of the shot.

But on shipboard heavy guns may, as regards the recoil, be safely fixed. The ship itself is not a fixture, the vibration is absorbed in the water. With very heavy guns in a light vessel, there might be a disadvantage; the ship might heel over and throw the shot into the air, so as to deceive the aim. There are two kinds of recoil, one in which the gun passes through a given space backwards, and the other in which it expands itself on an elastic vibrator. If, for example, a heavy mass of vulcanised india rubber were placed behind the breech of the gun covered with a thick iron plate, the vibrations would be absorbed without the given passing through space; or the gun-carriage might be arranged to slide back up an inclined plane still preserving its horizontal level.

On shipboard pivot guns on deck do not involve difficulties; they can be turned inboard to load; but between decks, the muzzles must be out at the ports and the loading must be more exposed to difficulties.

All tendency to recoil is simply a proof that the machine for throwing is not proportioned to the projectiles. To make a bad machine-cannon, and then to tinker it by tying it down, is beginning at the wrong end. We have done much, but there is as much more yet to do ere we have exhausted our experiments either in great guns or small arms. We should aim at knowing what end we propose before we begin our experiments. Precisely the character of mind possessed by General Bentham.

I am, Sir, yours faithfully,
W. BRIDGES ADAMS.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Aug. 25th*, 1854.]

Dated 13th May, 1854.

1544. R. J. Maryon, 37, York road, Lambeth—Steam engines for transmitting motion.

Dated 25th July, 1854.

1628. Hugues Champonnois and Jean Baptiste Bavelier, Dijon—Treating beetroot and all other sugary and feculent vegetables.

Dated 29th July, 1854.

1680. E. J. J. Dixon, Bangor—Apparatus for teaching reading and arithmetic.

Dated 3rd August, 1854.

1704. H. Gerner, Moorgate street—Omnibuses.
1706. C. Tetley, Dulwich—Rotatory engines.

Dated 4th August, 1854.

1708. E. Hallen, Cornwall road, Lambeth—Chairs, chair bedsteads, and other seats and bedsteads.
1710. M. A. Dayley, London street, Fitzroy square—Consuming smoke and economising fuel.
1712. E. Hamilton, Edinburgh, N.B.—Manufacture of beverages or occasional drinks.

1714. C. W. Harrison, Richmond—Electric currents, and treatment of products derived in obtaining same, partly applicable to the production of motive power.

Dated 5th August, 1854.

1716. C. F. Stansbury, 17, Cornhill—Machinery for making rope. (A communication.)
1718. C. F. Stansbury, 17, Cornhill—Cut nail machines. (A communication.)
1720. J. Cunningham, Deith, N.B.—Production of printing surfaces.
1722. J. H. Johnson, 47, Lincoln's inn fields—Railway and other wheels. (A communication.)

Dated 7th August, 1854.

1723. G. W. Yapp, 17, Cornhill—Steam boiler and other furnaces.
1724. E. Alexandre, Paris—Concertinas.
1725. G. A. Cox, Lochee, Dundee, N.B.—Machinery for winding yarns or thread.
1726. J. B. T. Aubert and A. Cossus, Paris—Fibre from woollen rags.
1727. J. H. B. Thwaites, Bristol—Communication by cypher.
1728. J. Knight, Stamford—Engines by steam, air, or other fluids or liquids.
1729. E. F. Duquesne, Brussels—Gas for illumination.
1730. S. Lucas, Sheffield—Manufacturing steel.

Dated 8th August, 1854.

1731. H. Dircks, 32, Moorgate street—Boiler and other furnaces for prevention of smoke.
1732. T. Waterhouse, Sheffield—Machinery for cutting files. (A communication.)
1733. H. Stoy, 1, St. John's road, Battersea rise—Stopping carriages on railways and vehicles on the common roads.
1734. J. Hulme, Manchester—Preventing the explosion of steam boilers, measuring the pressure of steam, and heating water for the supply of boilers.
1735. H. Turner, Leeds—Preparing hides and cutting driving straps.
1736. H. Moorhouse, Denton—Machinery for preparing cotton, wool, or other fibrous materials.
1737. C. White, 99, Tachbrook street, Pimlico—Printing blocks for printing ornamental or decorative paper.
1738. A. Corvi, Paris—Musical instruments.
1740. E. Webb, Worcester—Power loom for weaving horse hair and other fibrous substances.
1741. W. White, Bayswater—Deodorizing cesspools, &c.

Dated 9th August, 1854.

1742. W. C. Pitt, Pimlico—Knobs and roses used with locks, latches, &c. (A communication.)
1743. T. Kaye, Grange Moor, Whitley Lower, near Dewsbury—Reversing motion of steam engines.
1744. P. Oulton, Dublin—Motive power.
1745. W. A. Gilbee, 4, South street, Finsbury—Hydraulic machines, (A communication.)
1746. J. B. A. M. Jobard, Brussels—Pump.
1747. J. Lucas, Lincoln—Pulping vegetable substances.
1748. J. Livesey, New Linton—Manufacture of fringes.

Dated 10th August, 1854.

1751. E. W. Uren, Foggintor—Machinery for bricks.

Dated 11th August, 1854.

1753. S. Bickerton, Oldham—Gas light governor.
1755. P. G. Greville, Lombard street—Cards for working wool and cotton. (A communication.)
1757. J. Tennant, Shields Monkton, N.B.—Grubbers for agricultural purposes.

Dated 12th August, 1854.

1759. T. Cox, 29, Southampton street, Strand—Stools, cushions, and hassocks.
1761. T. G. Taylor, King's Arms yard—Application of hop plant in manufacture of paper, &c.
1765. J. B. Daines, Charles place, De Beauvoir square—Treating surfaces of stone, &c., for preservation from decay.

Dated 14th August, 1854.

1767. J. T. Stoneham, Manchester—Waterproof fabrics.
1769. J. Moore, Manchester, Samuel Beswick, Failsworth, and B. Wilson, Woodhouses—Piled fabrics.
1771. W. and J. Todd, Heywood—Power looms.
1773. H. Smith, Smethwick—Wrought iron wheels.

Dated 15th August, 1854.

1775. J. and C. Greaves, Birmingham—Spectacle frames.
1777. J. Norton, Cork—Bolts and projectiles for fire-arms.

Dated 16th August, 1854.

1779. R. Caunce, Bolton le Moors—Preparing cotton and other fibrous materials.
1781. T. Atkins, Oxford—Preparing land, constructing machinery for applying under current arterial circulation of fluid manure, gases, vapours, and air to the seeds and roots of plants.
1785. S. Frankham, Greenland place—Consuming smoke and economising fuel.
1787. W. Kennard, Little Queen street—Attaching door or other knobs and handles.
1789. W. Siddons, Birmingham—Locks for guns and fire-arms.
1791. E. Hamilton, Edinburgh, N.B.—Beverages or drinks.
1793. W. Johnson, 47, Lincoln's inn fields—Consumption of smoke. (A communication.)

INVENTION WITH COMPLETE SPECIFICATIONS FILED.

1823. H. Bauckham and H. Glover, Southwark—Apparatus for securing corks or stoppers into bottles for effervescing liquors, or wet or dry ingredients, &c.—19th August, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed August 25th, 1854.

475. Richard A. Brooman, 166, Fleet street—Improvement in the manufacture of tin foils or sheets.
477. L. A. Pallegoix, and L. Bellange, Paris, and 4, South street, Finsbury—Improvements in treating wheat and other grain.
478. T. Denny, Strasbourg, and 4, South street, Finsbury—Improvements in engraving.
482. J. H. Rehè, Bayswater—Improvements in machinery or apparatus for mixing, washing, crushing, bruising, reducing, or comminuting various substances.
491. J. S. Holbeche, Sutton Coldfield—Improvements in the construction of invalid bedsteads, which said improvements are also applicable for couches, chairs, and reclining seats or beds for invalid carriages.
528. R. Madeley, Birmingham—Improvement or improvements in the joints and framing of metallic and other bedsteads, chairs, sofas, couches, and such other articles as are or may be used for sitting, lying, and reclining upon.
533. D. Barr, Clerk, Sudbrook park, Richmond, Surrey—Improved combined hair brush and comb.
649. P. M. Parsons, Duke street, Adelphi—Improvements in the construction of the permanent way of railways.
805. A. Taylor, Warwick lane—Improvements in moderator lamps.
1135. L. Sautter, Paris—Improvements in lighthouses, and in lamps for lighthouses and other places.
1252. S. S. Alison, M.D., Park street, Grosvenor square—The manufacture of a new material to be used for external applications in medicine.
1515. T. F. Henley, Brompton—Improvements in the preparation of certain colouring materials.

Sealed August 29th, 1854.

514. J. Tann, Minerva terrace, Hackney road—Improvements in the construction of locks.
519. J. Nicholson, Dublin—Improvements in and applicable to certain descriptions of close kitchen ranges.
526. C. Nightingale, Wardour street, Soho—Improvements in the mode of curling horse hair and other materials.
538. Thierry Hubert de Nivelles, Foley place, London—Certain apparatus for separating metallic from earthy and other substances, and for classifying metallic substances according to their specific gravities.
550. George Beardsley, Coal Pit lane, Nottingham, firm of George Beardsley and Company—Improvements in round or circular machinery for the manufacture of textile and looped fabrics.
558. William Warne, Lower Blowing house, St. Austell, Cornwall—Improvements in tubular steam boilers or generators.
565. William Beckett Johnson, Manchester—Improvements in strengthening the ends of tubes to be attached to boiler plates, or to be used for other such purposes.
583. Désiré Parfait Lefèvre, Paris, and 16, Castle street, Holborn—An improved railway brake.
653. John Bird, junior, Manchester, machinist—Improvements in the manufacture of silk into threads required for woven fabrics, for sewing, and for other purposes, and in machinery to be used for these purposes.
669. Richard Roberts and George Coppock, Heaton Norris, Lancashire—Certain improvements in looms for weaving.
677. John Healey, John Foster, and John Lowe, Bolton le Moors—Improvements in certain parts of machines used for preparing, slubbing, and roving cotton and other fibrous materials.
693. Benjamin Fothergill and William Weild, Manchester—Improvements in obtaining and preparing the fibres of plantain, penguin, and other vegetable substances for manufacturing purposes.
699. James Robertson, Glasgow—Improvements in lifting or transporting heavy bodies.
717. William Hahner, Leghorn—Improvements in the manufacture of muriatic and sulphuric acids.
719. William Habner, Leghorn—Improvements in the manufacture of alkaline sulphites, and in purifying and treating gases.
721. John Henry Johnson, 47, Lincoln's inn fields, and Glasgow—Improvements in the construction of millwork and in the mode of driving the same, part of such improvements being applicable for transmitting motive power generally. (A communication.)

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Aug. 24.	3630	Appendage or Addition to a Penholder.	Baker and Finnamore	Birmingham.
29.	3631	The Double-fronted Shirt.....................	Charles Paris Pool............	7, Compton place, Canonbury square

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 8, 1854.

Educational Exhibition.

This Exhibition closed on Saturday last. Mr. Harry Chester, who had undertaken to deliver the concluding lecture, at 8 p.m., was seized with sudden illness, which prevented his performing that duty.

Reports on the different departments of the Exhibition are in the course of preparation.

The accounts of the receipts and expenditure are not yet completed, but it is certain that there will be a considerable deficit beyond the receipts and the sum already subscribed.

The Special Subscriptions amount at present to only £1,079 18s. 0d., including a subscription of £100 from H.R.H. the President. It is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid.

ABSTRACTS OF PAPERS, LECTURES, AND DISCUSSIONS.

Tuesday, August 22nd, at 8 p.m.

On the History of Musical Notation. By the Rev. W. W. Cazalet, M.A.

The lecturer commenced with a short account of Greek music, explaining the system of tetrachords upon which it was based, the limits to which it was extended, and the notation, being simply the letters of the alphabet placed in various positions, and often mutilated. The lecturer then explained the Ambrosian and Gregorian modes, pointing out the characteristics of each, and the meaning of the terms authentic and plagal, the first of which referred to the Ambrosian mode, and the latter to the Gregorian, the first comprising an octave, and the second an extension of an octave below its fifth. After briefly alluding to the introduction of the organ into the churches of the west, and shewing the probability that to this circumstance must be attributed the origin of sounds in consonance, or the basis, in short, of the modern system of counterpoint, the lecturer pointed out the gradations which the notation underwent; first, the single line, extending at length to as many as ten, and the simplifying this process by Guido, who limited the number to five, and invented the use of the spaces between the lines. The lecturer explained also the Guidonian system of the herachords, by which the position of the semitone was accurately determined, this having been previously one of the principal sources of the difficulty of intoning. The lecturer then showed how the present system of notation arose, the characters longer than the breve being simply modifications of the square b, without the tail for the breve, and the characters above the semibreve being derived from the round or flat b, with the addition of tails for the present quavers, semiquavers, &c. After recapitulating all the steps in the development of the present system, the lecturer concluded with a few short but impressive observations on the study of music as an element in the advancement of education.

Friday, September 1, at 5 p.m.

On Infant Training (Kindergarten). By Madame Ronge.

Madame Ronge, after entreating the kind forbearance of the audience for her imperfect English, proceeded to state that, being convinced that the seeds of virtue or of vice take root in the infant mind between the ages of three and seven, she could not resist the strong desire which that conviction excited, to do all in her power to protect the infant against vicious influences, by developing its faculties, and thus enabling it to become a law unto itself. And her friends in Hamburg, in the year 1849, engaged Mr. Frederick Froebel, the inventor of the system, for the term of six months, to live with them, and teach a class of 24 ladies and a few gentlemen, all of whom were naturally adapted to become teachers. And when they had acquired a practical knowledge of the system, they were sent then out to different parts of Germany, to put their knowledge into practice, by forming Kindergartens. Since then Mr. Froebel has died, but the work has gone on successfully. In 1851 Madame Ronge introduced the system into England, and formed a Kindergarten at Hampstead, but sickness obliged her to leave the neighbourhood. Having settled in London, she determined to make another attempt, by forming a Kindergarten at her own residence, 32, Tavistock-place, Tavistock-square; and the opening of this Exhibition giving her a hope that something might be done to realize the idea, she sent a few of the results and playthings to the Exhibition, which has led to the present lecture being delivered.

In the first place, Mr. Froebel named this system of infant training Kindergarten, or Children's Garden, from the analogy which subsists between the rearing of young children and the rearing of plants. We know that the little child is something more than the plant—the teacher has a higher responsibility than the gardener—but, as their work is similar, the symbolic term has been given. The chief aim of this system is to educe the creative powers of the mind. The child first manifests this power by destroying; it likes to remove everything, to change the places of all the objects by which it is surrounded. Of what use would be the rattle to the child if it did not move and make a noise; of what use the bell if it did not ring; the ball if it did not roll.

The child grows older; it can run about. What does it generally find in the nursery? The toy-shops have supplied every variety of dolls, animals, houses, &c. But of what use are they? What can it do with them? They are finished. It wants to create; it tries to do so; it pulls off the head of one, the legs of another, scatters their remains about the room. It dissects the whistle, the trumpet, the drum, to ascertain where the sound comes from. It takes to pieces the very boxes in which they are kept, and having finished the whole it is fully satisfied,—they have done their work, they are no more required; and, like Alexander the child looks out for another world to conquer, and says "What shall I do now?"

He now asks his mother for something new; she is perhaps unable or unwilling to comply. He looks about for something; takes, perhaps, what is of great value—of this he knows nothing; his standard of value is not the mother's—he destroys it, and pain is the result. But when you ask the mother what she has done to direct this power in her child—this power which is the unseen genius struggling for a free development—she replies, "I spend my money where it is wanted; I have a good kind-hearted nurse; I play sometimes myself with it." But has the nurse been trained to understand the nature of the human being, and the art of developing the child's faculties by directing its actions. You do not entrust your silk, satin, lace, linen, silver, &c., to kind-hearted people who do not understand their business; and yet you entrust the most precious object you possess to the care of ignorance, though the greatest educators, both of past and present time, have again and again affirmed that the training of the infant determines the individuality of the adult. How important, then, becomes the question,—What can be done to give practical instruction to nurses, young ladies, mothers, and infants?

Doubtless, the English are much advanced in infant

training; but their system does not include all classes of society, and there are no arrangements by which every female may become a teacher of the infant.

The children of the rich, though surrounded with luxury, feel as lowly as the children of the poor in the humblest cottage. The luxury is not for them; they cannot appreciate it; nor can the kindness and care of a governess or nurse give them any delight compared with that of a companion of their own age.

The boy in the street with his play-fellow, though clothed in rags, is far more joyful than the child of the wealthy, dressed in all the elegance of fashion, who, through the plate-glass window of the mansion guarded by his governess, looks down upon him, and often longs to exchange its grandeur for the liberty of the peasant.

The biographies of our great men (many of whom have sprung from humble life) show that in their youthful days they enjoyed a freedom, not allowed to the children of the rich in our times—may not the source of their greatness in many cases be attributed to their more natural early training.

Remember how much genius was developed in the plays of the Greeks, and how great was their progress in the fine arts. We pity the oppressed, we sympathize with the slave, we justly condemn cruelty to animals, too well; but each of these has some power of defence. The little infant has none. To protect the child, then, is the duty of society. Where do we look for the great source of despotism? Where is the coward nature formed? in the nursery or the school. Tis' there where the greatest skill and care are required, to prevent the development of character, which, once formed, cannot be truly reformed.

You may ask, Will not the mother's love find out means to develop the child better than any system? True, this system is but an accumulation and arrangement of the results of such means collected from hundreds of mothers. It is true a mother's love is not to be undervalued; it is stronger than death; but love must be combined with Erkenntnitz, there is scarcely an English word to express the idea—it may be said—with a recognition of the child's whole being; but even that will not convey the idea correctly; the lioness loves its young, will fight for it till death; the ape loves its offspring, and in fondness will press them to its bosom till it destroys them; but to understand the idea, there must be a recognition of the feelings of the Spartan mother, when she equipped her son for the war; and said, "return my son either with thy shield, or on thy shield, but not without thy shield." His *honour* was to her more than life. And of the German mothers who killed their offspring rather than allow them to grow up the slaves of the Romans; and Virginius who sacrificed his daughter rather than allow her to be the victim of Claudius. In these examples will be seen the difference between the love of the animal and the love of the human being; the one is confined to the material being, the other loves the soul of its young. The mothers of the present day have a spiritual duty to perform; they have to awaken the first sparks of true dignity in their children; however, the mother is not to be reproached; it is not her fault; she has not been trained to attach sufficient importance to the subject. The young bride can dress, sing, speak languages, and exhibit many accomplishments; but this has been hid, from her as a subject with which she had nothing to do; and when she feels the need of it it is generally too late and she is obliged to entrust her most precious treasure to the care of ignorant nurses, who know no more than herself. Is her child sick, she can send for a doctor. Is it naughty, she has no doctor for it; she can find no medicine; hence she sends it to school, in hopes that others will be able to do that which she cannot do herself, and at the same time it will learn something. The child must now be subjected to a course directly the contrary to all its experience; he dreams of green fields, play, and liberty, but cannot enjoy them; in time he is subdued—in many cases nature retaliates. Health departs, genius is checked, if not crushed; and the parents are astonished that their hopes are disappointed. As well might they put out a fire, and then be astonished that it does not burn.

The kindergarten supplies what is wanted by the mother, the child, the nurse, the teacher, the young lady, and society. Children from three to seven years of age are trained together, and caused to contribute to each other's happiness, usefulness, and development. Play is to the child what pleasurable-voluntary labour is to the adult. Froebel told the lecturer that he had invented nothing—that he had only watched children at play, and from them collected materials for his system; he had simply organised those materials in such a manner as to promote the harmonious development of the child.

This system forms a basis for the most useful and industrial arts and sciences in the infant mind. It cultivates the love of beauty, and excites the body to harmonious exercise—the *royal road to health*.

The system seeks to make the child happy, and the happy child is good. It is simply to awaken, not suppress, its noblest feelings, and draw forth its individuality by these means. Parents can easily ascertain the natural talents of their children, and thus determine their future proceedings.

Madame Ronge then illustrated, by means of a class of pupils, the songs and games with which the children were taught to amuse themselves, and she pointed out how children, by means of a few simple pieces of thin deal, cubes, &c., could become perfectly amused and easily instructed in their occupation, and shewed how their ingenuity might be exercised in cutting out a variety of patterns in paper, &c.

Madame Ronge then concluded by stating that, with the assistance of some English ladies and gentlemen, she and her husband had founded an institution of this kind; and that on Tuesdays, between 10 and 12 o'clock, at their residence, 32, Tavistock-place, Tavistock-square, they would be happy, and, indeed, were most anxious, to give any information, and at all times would be ready to assist in extending the benefits of this system to the poor. She and her friends would be only too glad, by lectures or any other means in their power, to promote the success of this cause.

FRIDAY, SEPTEMBER 1st, at 8 p.m.

HOW TO TEACH READING. BY HUGO REID.

Mr. Reid began his lecture by remarking that as the method of teaching to read by commencing with *phonetic* symbols, and then teaching the child to translate these into the common character (where they differed from it —in sixteen instances), had had the benefit of a full explanation at St. Martin's Hall, he felt a great desire to show that there were other methods tried and approved besides the phonetic and the old spelling system with which it was usual to contrast it. The phonetic method he put aside, as having been already explained, and confined himself to the methods of teaching by the ordinary letters of the alphabet.

It is evident that considerable difficulty attends the teaching of reading, so much so, that an eminent educationist has given it as his opinion that to learn to read, though the first, is the hardest task ever presented to the mind. It was sometimes said, "It is not so much the system taught as the man who teaches, which makes the important point." But this was a very dangerous proposition. If you have a very superior teacher, he may make progress with a bad system, but it is self-evident that he will make greater progress with a good one; and as in all professions there are men of ordinary abilities, so in that of teaching also we must expect to find such persons, and in their case it was of the utmost importance to have a good method on which to proceed.

It is the more important to discuss this subject, because

the common method pursued, teaching the child to spell the word by the names of the letters, and then repeat it, is found very unsatisfactory in its results, many children in the common schools acquiring so very imperfect a power of reading, even in several years' attendance, that after leaving school they never take up a book except in cases of necessity, or to spell out something very exciting. They ought, on the contrary, to be able to read with the greatest ease, so that their minds might be at liberty to grapple with the subject-matter of the book, and find no obstacle in the medium through which it is conveyed to them.

He hoped to show to-night that there was a system, long and successfully tried, which rendered this perfectly practicable.

In setting out, he laid down what he considered four great principles to be observed in teaching to read:—

I. Teach the ultimate elements, that the learner may acquire a self-teaching power.

II. Use at first the *powers*, not the *names* of the letters.

III. Teach only a few elements (or powers of letters) at a time, showing how to form words and syllables with those, before introducing new ones.

IV. Teach first the more common sounds and common combinations of those sounds, gradually introducing the less usual, the exceptions, and anomalies.

There are in reality but three systems for teaching reading: the *whole-word* system; the *elemental* system; and the *mixed* system, combining these two.

The whole-word, or as it is sometimes called the *look-and-say* system, teaches the child each word separately, as a distinct thing, without analysing its composition, and is, therefore, contrary to the first principle laid down, giving the child no self-teaching power, making him depend on the teacher for each new word.

The common method, with a very great number of words, is essentially a whole-word system, for it is evident that the preliminary ceremony of naming the letters which compose a word is no analysis of their powers in that word. Saying aitch, ā, tee, is no help towards combining the sounds of these letters in the word *hat;* nor aitch, ō, double-u, to the sound of those letters in *how*. The child believes that these words are *hat* and *how* because he is told so, and learns them as whole words, the names of the letters being no sort of assistance to him.

The elemental system also exhibits two forms: the *syllabic*, which takes syllables as the elements of words; and the *phonic*, which separates the consonant and vowel sounds in each syllable, and teaches these as the ultimate elements.

This is the system which the lecturer recommended to his audience, and though he would not overwhelm them with authorities, but lay it before them for judgment, yet he would just mention that it had been adopted in many parts of Germany and France, and by many teachers in Scotland and America, while it had received the sanction of our own Committee of Council on Education. He had acquired his own knowledge of this system from Mrs. Reid, who had learned it from the late Dr. Angus, of Glasgow, he having for forty years taught it with the greatest success in that city, his pupils acquiring the art of reading with facility in from three to six months. In that country it was also recommended by the Association of Scottish Teachers for publishing School Books, and by the high authority of the Rev. Dr. Macculloch, whose reputation as a teacher and writer of school-books was not confined to Scotland. Dr. Angus, the Association, and Dr. Macculloch had prepared excellent *primers* for teaching to read on this plan. Dr. Angus used, as auxiliary to the system, a box with moveable letters, having a ledge in front, on which to arrange them in any combination. The first steps are to teach the long and short sounds of the vowels. These are by far the most common elements of words, and the learner ought to be quite familiar with the one set of these sounds before going to the other, but it is not material with which he commences. We will commence with the long sounds ā, ē, ī, ō, ū, y * (as in hate, mete, bite, bone, tune, by) giving y precisely the same sound as i. When the child knows these perfectly, so as to point them out in any book, opened at any place, which he will very soon do if confined to these, it will be time to teach him two or three consonants,—we will choose three, distinct in their form and sound, and of very frequent occurrence, m, t, and r. As soon as he knows these with the same familiarity as the vowels, teach him to join the sounds into the syllables *ma, me, mi, mo, mu, my;* when he knows this thoroughly, so as to place the moveable letters with quickness and precision when the teacher makes the sound, or to give the sound when the teacher places the letters, we take him a step further, and as he has learned to unite *m* to the vowels, teach him to unite these combinations to another consonant. He will here be taught also that these vowels have many other sounds besides the one now given him, and that an *e* which is quite mute is the sign used to mark the sound he has learned in the words he is now to learn. A child understands this as readily as any mark over the vowel, and as it is the real sign employed, it is as well to teach it at once. He will now learn to add the sound of *t* to his former lesson, omitting the *y* which does not often occur in words of this class.

mate, mete, mile, mote, mute.

This lesson, and all which succeed, must be treated like the last—namely, he must articulate distinctly and promptly every word when the teacher places the letters, or be able to place the letters promptly when the teacher articulates the word. From this stage the great difficulty is passed; the child has arrived at words with which he is familiar, he has acquired the power of forming them himself, and will learn willingly new elements to increase that power. The letter *t* must now be treated in the same way as the letter *m* has been, be joined with all the vowels till that combination is quite familiar, then a final consonant sound, with the silent e added—

ta te ti to tu
tame tere time tore tune

The letter *r* must then be treated in the same way, and and so on with all the consonant sounds in succession. The child should be thoroughly assured of each step before he advances another, and be constantly revising and repeating *all* he has learnt; a little variety in the mode of teaching may be adopted—the teacher may place before the learner a simple combination, as *mi, la, ba*, then ask what must be added to form *mine, lane, babe*. Whenever any combinations occur which do not form actual words, the child, now having confidence in its teacher, and feeling its progress, will be satisfied to learn that these are syllables or parts of longer words, to be mastered afterwards. There are only four consonants which require any particular treatment—*c, g, q, x*; *c* and *g* have each two very different sounds, the hard and soft. The hard should be taught first, followed by the vowels *a, o, u*; and the soft after a considerable interval, followed by the vowels *e, i, y*. The letter *q* should not be taught alone, but among the compound consonants, with its never-failing companion, making *qu; x* occurs so very seldom that it may be omitted till the learner is well advanced, and reading easily.

Many teachers are in great haste to introduce short sentences to the learner, thinking these, as no doubt is true, more interesting than lists of words; but the objection to lists of words vanishes in the mode of teaching here described; the child, with his moveable letters, and his knowledge of their powers, takes as much pleasure in constructing *words* as in making boats, building little houses, or any of the interesting labours of the kindergärten. Silly, unmeaning sentences do not interest children more than grown people, but building up words from the elemental sounds always does.

* But it is not necessary to use the sign of the long sound a above; the child is taught only that sound at first, and afterwards the rule to distinguish when the long, when the short sound must be used.

The pupil may now be taught to add a final *s* to the words he has learnt,

cares, times, bakes, &c.,

and the syllable *ing*, cutting off the silent *e*,

earing, baking, tuning, &c.

When these exercises have been mastered, the long sounds of the vowels must have become quite familiar; and the pupil havingbeen informed all along that they have other sounds, will not be at all confused on being introduced to them. This ought to be done one by one, and the same sequence observed in uniting the consonants as was done in combining the long sound; that is to say, join the short sound of a (as it sounds in hat) to all the consonants taken as initials, *ba, ca, ma, ra, pa*, and as soon as the learner can place any such combination on the desk, when he hears the sound, or articulates the sound, when he sees the combination (and this he will very readily do, being already familiar with the powers of all the consonants), he must be taught to unite to it any of the other consonant sounds, producing such words as *mat, rat, cat, sat*, and so on through an almost endless variety. The pupil must here be made to remark that the absence of the final mute *e* is the sign which indicates when the vowel has this new sound in the class of words now studied, and must be exercised on the two classes of words mixed *mate, mat, bit, bite, not, note, rate, rat, fate, fat, &c.*; precisely the same process must be gone through with all the other vowels in succession, resting long enough on each one to prevent any risk of confusion before proceeding to the next; nor need the teacher regret resting long on the short sound of each successive vowel, as all the exercises of combining that sound with the consonants, familiarise and confirm the learner in his knowledge of the consonant powers, and enable him to distinguish and articulate them with the greater ease and quickness. In this class of words or syllables, *y* has the same sound as *i*, its initial sound as in yes, year, you, &c., being reckoned among the consonants. The words in this class which end in *f, s, l*, are always written with those letters doubled, and those that end in *k* are written with the *ck*; the learner ought to be taught to form these words correctly from the beginning, and to know that the double letters have just the same power as if they were single. Following the same order as with the name sounds, the pupil may now add *s* and *ing* to these words, learning to double the last consonant where it is single, before adding the syllable ing. This introduces him to the very general rule in English that a double consonant marks, the short sound in the preceding vowel. He must now point out or form such words as baking, backing, robing, robbing, tuning, rubbing, tiring, sitting. He may now be taught to add *ed*, the same rule holding good of a single preceding consonant for the long sound and a double for the short as robed, robbed, baked, backed, tuned, rubbed, tired, sinned. While this regular course of tuition is going on the teacher may introduce his pupil to such syllables as *tion, ness, ly, ous*, which will without confusion or difficulty greatly enlarge his power of forming words. The compound consonants ought now to be learned, one at a time, as representing a single sound, or slightly varied, as th in different words, *sh, th, ch, wh, qu, ph*, are all striking to the eye, and are never confused by the learner with the separate sounds represented by the individual letters of which they are composed. There is therefore little use of a new character to represent them. They must be taken each successively as a new consonant, and go through the same process as the other consonants did, *sha, she, shi, sho, shu, shy, sham, shire, shore, shot, shut, shames, shams, shaming, shamming*.

In the first instance, its effect in combination with all the vowels should be shown, but in the succeeding steps such combinations may be passed over as do not form real words.

We now come to the double vowels, or dipthongs, and choose first those which are invariable in sound, *oi* and *oy*; then going to those which have the same sound in a large number of words *ou, ow, au, aw, ai, ay, ea, oo, ee, oa*; they should be treated as the simple vowels have been before, *e i* joined to an initial consonant, and then a final one added &c., *boy, boi, boil, boils, boiling, boiled*, and so on with all the others, remarking that a double vowel or dipthong is never followed by a double consonant, either in simple or compound words. The learner, now quite familiar with the powers of the consonants, can unite two of them together, in such words as *snake, trade, hand, frock*; and words of any number of syllables if these are constructed on the principles he has learned, as they generally are. He may be taught the effect of *le* at the end of a word of more than one syllable as *table, rattle, muffle, noble, feeble*; the double consonant here distinctly marking the short sound of the preceding vowel, the single consonant the long sound, and the double vowel being followed by a single consonant. His old rules and general principles of constructing words are thus confirmed in a new class of words. Silent letters may now be taught, and *gh* a very remarkable character, and of frequent occurrence may commence them; *sight, light, caught, bright*, &c., have no difficulty when the silence of the gh is known, the other letters having their common powers.—He would not specify more classes of words; he had been thus particular in describing the method of teaching by the phonic system those large classes of words he had mentioned, because he was assured it was a good system, and because he had been informed that many teachers found great difficulty in teaching to read, proceeding in a sort of hap-hazard manner, sometimes on one tack sometimes on another; all these he hoped would study this method. He would not enter into further details, irregular, and occasional sounds of vowels and dipthongs, ought to be taught by degrees, in words with which the child is familiar. Exceptions to the rules he has learned and words quite anomalous will meet him in very common words in the first book he opens, such as *have, are, get, eye, one, to, do*, &c., but such words are of frequent occurrence and very few; thus they are soon mastered. Such words may be learned one by one, as the teacher sees fit, while the regular course is going on; or they may be learned in any pleasant reading book, suited to the age and capacity of the learner, just as they occur.

It will now be very evident that this method of teaching the art of reading is quite agreeable to the four great principles already laid down..

It gives a self-teaching power. The learner very soon takes great pleasure in finding out words for himself; he likes that a great deal better than to be told what the words are; this is a very useful mental exercise to him, besides teaching to read. It is not so much in removing difficulties, that the great art of a teacher consists as in giving the pupils means and motive to master them himself. On this system the teacher gives the pupil these means, and he very soon feels himself acquiring power, not over this and that word, but over large classes of words; he feels delighted in his newly-acquired power, and exercises it with eagerness. The accordance of this system with the other three principles is so evident that it is needless to insist on it.

Children of three years, of ordinary abilities, if taught on this plan by their mothers, for twenty minutes or half an hour a day, will be able to read fluently, and for their own entertainment, at the end of a year. This is an immense source of happiness to them. It is well known how fond little children are of listening to stories, and that they will leave almost any romp for that entertainment, the *same* story being requested over and over again. If a child can read with the same ease as it can hear, it has precisely the same pleasure in reading tales as in hearing them; and such books as "Anderson's Fairy Tales" become a source of never-ending delight. It may also be mentioned that the system has a strong tendency to correct imperfection in pronounciation and indistinct articulation, the improper aspiration of *h*, and the sounding of a final *r* after such words as *Emma, idea*, &c. It also facili-

tates the acquisition of the proper pronounciation of foreign languages, by accustoming the ear to mark distinctions of sound.

Presenting pictures and objects to the pupil along with words is a favourite idea of some teachers, but this in itself cannot be said to constitute a system of teaching to read. Pictures and objects may be used to illustrate in this system as well as in any other.

It is also a favourite idea that children can only be interested in learning to read by having some sentence, or fact, or story, presented to them at once. No doubt it is well to come to these soon, but it is by no means necessary at first. To build up single words with his moveable letters, and to find out single words presented to him by the same means, is an exercise which is really as full of meaning to a young child, as constructing these words into sentences is to an older one. Odd, unmeaning, silly sentences are not half so interesting as single words. It is much better to have patience till the learner has acquired a sufficient stock of words to read with tolerable ease something really interesting.

It is not by any means proposed by this method to throw aside entirely the names of the letters or their order in the alphabet, but only not to teach these as a preliminary to reading. When the pupil has gone through the course which has been described he may be allowed to call the letters by their names, which he will no longer confuse with their sounds; and if an alphabet is given him he will know (without any teaching) the order of the letters, long before he has occasion to consult a dictionary.

With regard to spelling, the experienced teacher will easily see that during this course the child is learning to form correctly (and this, not the naming of the letters which compose words, is the essence of spelling) large classes of words which compose the vast majority of the words of the English language. He will see with how much greater ease exceptions and anomalies will be learned, when they are seen to be few and striking, than when everything appears a mass of confusion. People often speak as if the whole language were composed of words like *laugh*, *cough*, *plough*, *rough*, *colonel*; but, with all its irregularities, this is far from being the case; and by taking advantage of such general laws as are found to pervade the structure of the English language, simplifying the process of learning by teaching only the real sounds of the letters at first, and thus making the child interested in the process, and able to assist in it by his own efforts, we may impart the power of reading easily and fluently, without much trouble, in a few months, and at an early age.

The lecture was followed by a long discussion, which exhibited the greatest variety of opinions on the subject. With one exception the speakers condemned the old system; some were more favourable to the whole-word system, while others thought that the system recommended by the lecturer possessed very great advantages over any other yet known. It was manifest from the discussion that the subject needs much to be further ventilated.

SATURDAY, SEPTEMBER 2nd, at 5, p.m.

The Secretary regrets that Mr. W. A. Shields has been unable to furnish an abstract of his lecture for this week's number, but trusts he will be able to do so next week.

REPORT ADDRESSED TO THE MINISTER OF INSTRUCTION IN FRANCE, BY M. MILNE EDWARDS, DOYEN DE LA FACULTE DES SCIENCES, SPECIALLY CHARGED TO REPRESENT FRANCE AT THE EDUCATIONAL EXHIBITION.

Paris, July 13, 1854.

SIR,—The Society established in London in 1754, for the Encouragement of Arts, Manufactures, and Commerce, desired to mark the Centenary year of its existence with some efforts to develop an improved education for the people. With this object in view it determined to furnish the public with the opportunity of comparing and appreciating the different means of instruction generally in use; and opened this year an Exhibition of books, maps, models, and other articles used in elementary teaching and in teaching the applied sciences. The Society sought the assistance of other countries whose governments took an interest in the diffusion of knowledge. One of its members having had the honour of explaining to his Majesty the Emperor the object of the Society, the co-operation of France was at once accorded.

In your letter of the 30th June last, you were pleased to appoint me to represent the University of France, in connection with the Committee which, under the Presidency of H.R.H. Prince Albert, had taken charge of the organisation of this Exhibition; and, in conformity with the instructions sent me by your Excellency, I started for London on the 1st July.

The Society to which I was accredited has for some time past exercised a considerable influence over the progress of the industry and instruction of the working classes in England. It has distributed, in the form of prizes and other modes of encouragement, upwards of two millions and a half of francs. It took the initiative amongst our neighbours in those Industrial Exhibitions, whose utility is no longer questioned; and it has become the common centre of numerous Institutions for the diffusion of useful knowledge with which Great Britain is enriched, and which are due to those sentiments of patriotism and habits of association so largely developed amongst her people. It is reckoned that there are at this present time in England 1,057 of these Institutions for the teaching of popular science, and 355 of them are directly in Union with the Society of Arts in London. Science applied to the Arts is spreading in all directions; libraries for the use of workmen are multiplying with wonderful rapidity. Laboratories, workshops, and class-rooms for teaching the practical application of science and art, are lending their indispensable aid to that oral teaching with which we are too apt to content ourselves. The State, which until the last few years thought it right to take no care for the education of its children, now interferes actively and powerfully in the organization of public instruction. This last fact, is one of the things with which I was especially struck during the rapid glance I have just been enabled to make; and it is a source of satisfaction to see us approaching each other more in this respect as well as in many others. In former times the most opposite systems prevailed in the two countries. Amongst our neighbours independent teaching alone existed, and it was left entirely to private enterprise or to the patronage (more or less enlightened) of individuals or of corporations; whilst with us public instruction was entirely in the hands of the State, or at least subject to its direct control, and organised everywhere on a uniform system; but whilst France has been desirous of throwing open the field of instruction to the competition of all, and of leaving private Institutions to develop themselves side by side the National Establishment, England at the same time has seen the danger which must result from the absence of all direction and control, and from the want of the State's example and assistance, in the matter of education. She has now entered on a fresh path. She now sets herself to develop, by her own special care, the education of the people, whose progress no longer appears to her to be sufficient, and she seeks to exercise, by means of Inspectors, a real control over the direction of independent teaching.

In proof of this tendency on the part of the two nations to approach in their ideas as to how far the State should intermeddle with the administration of public instruction, it will be sufficient for me to recall to your recollection, on the one hand, the liberty which has been granted for some years past to industry and teaching in France, and to cite, on the other hand, some recent facts, with which your Excellency has not yet been made acquainted, re-

lating to the extent to which the State interferes in public instruction in England.]

It is only a few years since that the English Government was so entirely a stranger to all that concerned the education of youth, that it did not possess one single document relating to the number and population of schools, whether public or private, and in no way did it afford directly to the people any means of instruction. As soon as the Government undertook to watch over the great interests of the education of the nation, one of its first objects was to inquire into what there already existed, and the statistics of public instruction in England have recently been compiled with great care. From them we learn that England possesses at the present time upwards of 46,000 common schools, of which 15,500 are maintained in whole or in part, by public funds or voluntary donations; and of which 30,500 belong entirely to private enterprise. Besides these establishments, where an education more or less elementary is afforded daily to 2,144,000 children, there are also open for the working classes 23,500 Sunday Schools, attended by 2,400,000 children; and 1,500 evening schools, attended by about 40,000 adults. In 1851, the time when these documents were compiled, the population of England had reached 17,927,605 souls. The valuable statistics got together on the occasion of the last census show that the total number of children from three to fifteen years of age forms about two-sevenths of the whole population, and may be reckoned at about 4,900,000. Thus it is seen that the children who are entirely without the benefit of any school education whatever do not form one-tenth of this portion of the English people; but, that for more than half the children attending school, the education, even of the most elementary kind, must be very incomplete, since a small part of one day only in the week is accorded to it. If we compare with the whole population of England the number of children who receive daily instruction in schools, it will be seen that it amounts to about twelve per cent. of the inhabitants. I may add, that for the most part the schools admit at the same time children of both sexes, and that he boys are in the proportion of thirteen to eleven girls.

The average time that the children attend these schools appears to be above 4½ years, and it results from the information acquired by government that in the major part of these schools the instruction is of the most elementary kind. Thus, in every 100 boys, 88 learn reading; 62, writing; 56, arithmetic; 27 study English grammar; 30, geography; 4, modern languages; 4, ancient languages; 3, mathematics; 5, drawing; 10, music. The number of normal schools for the training of masters has considerably increased of late years, and at the present time there are about 40, nearly all of which receive assistance from the State, and are capable of admitting about 2000 scholars. Until lately, the State has exercised no interference whatever with schools, whether private or public—that is supported in whole or in part by public funds, local taxes, foundations, or voluntary rates; but twelve years ago Government established a system of inspection over those establishments, which as the condition of receiving its aid, voluntarily submitted to it. This control is now exercised over about 4,000, and produces excellent results. The funds employed in this way during the past year reached about 3,750,000 francs, and were applied to the improvement of school-buildings, to the salaries of teachers, the purchase of books, models, wall tablets, and educational appliances.

I may add that the accounts relating to the employment of these sums, and the reports of the Inspectors are submitted to Parliament, and made public every year by the Committee of Privy Council for Education.

Another novelty, not less important, consists in the creation of a great national school for teaching the arts and sciences applied to industry. This has been placed in a particular division of the office of the Minister of Commerce (*the Department of Science and Art attached to the Board of Trade*), and consists of three distinct establishments, but united and combined with each other, viz., a central school of the natural sciences applied to mining; a college of chemistry; and a school of fine arts.

The first of these establishments, founded in 1835, by one of the most distinguished naturalists in England, Sir H. De la Beche, under the name of the "Museum of Practical Geology," occupies at the present time a magnificent building, built for its reception, in Jermyn-street. It partly resembles our School of Mines, and partly our Museum of Natural History. In it are to be found magnificent geological specimens, and, two years ago, lectures on different branches of natural science, on metallurgy, and practical mechanics were established.

The College of Chemistry founded by an association of persons attached to science, at the head of which was Prince Albert, has recently become the property of the State, and under the skilful direction of Mr. Hoffman this school affords great advantages, enabling the pupil to see the practice of the science, whilst at the same time it teaches the theoretical principles. The arrangements of the laboratory are of the highest order, and are most perfectly organised.

Lastly, the Central School of Fine Arts is a still more recent establishment. It is under the direction of Mr. Cole, and occupies Marlborough-house, an adjunct to the ancient palace of St. James's. In affording this privilege to this young branch of the teaching establishments of the country, the Queen has given a fresh proof of her tender and enlightened solicitude for the true interests of her people; and it is with a sentiment of gratitude that on this as on many other occasions the English nation sees Prince Albert take an active part in realizing plans of general utility. At Marlborough-house drawing is taught; there collections have been got together fitted for forming the taste of those occupied in applying art to manufacture; there also are models prepared for teaching in the provincial schools in connection with the Government.

I fear I should take up too much of your time, sir, were I to enter into further detail of these schools and of many other institutions which will exercise a no less important influence over the education of the productive classes in England.

I have studied them with pleasure and profit. On some future occasion I may be permitted to enter on the subject at greater length, and if, as I hope, our Faculty of Sciences will be called upon to organize a system of practical studies which has been contemplated for these ten years. I shall borrow largely from the methods of teaching the good effects of which I have seen in the different establishments for public instruction which you charged me to inspect.

The Exhibition formed under the care of the committee presided over by Prince Albert, and called "The Educational Exhibition of the Society of Arts," has been of equal interest to me in this respect. I have there seen how much importance the English philosophers and teachers attach to the employment of the material means for demonstrating in every branch of instruction. I hope that at our Great Exhibition of the products of industry we shall have an opportunity of comparing with our neighbours what we possess in this direction.

This, I am convinced, will supply a very profitable subject for study to our professors, and it appears to me very desirable to invite the sending of models, wall-tablets, and other articles for teaching, largely employed in England and Germany, but too much neglected in France.

In fulfilling the mission with which your Excellency honoured me, I sought to strengthen and extend the good relations which exist already among the London body of teachers and the university of Paris.

I shall beg to submit to you some plans with respect to the mutual assistance which your department and the recent professional establishments may afford each other, and I may state that already the Director of one of these great schools, Sir H. De la Beche, has sent me publications

of great interest, presented for the Faculty of Sciences at Paris by the Government of Her Britannic Majesty.

At a very numerous meeting of the members of the Society of Arts and the principal different provincial Literary and Scientific Institutions in England, held in the Crystal Palace at Sydenham, under the presidency of Lord Granville, the Representatives from the United States of America, Sweden, Denmark, and France were received with every mark of honour and friendship. One of the committee (Lord Mahon) was charged with the duty of expressing, in the name of his colleagues, the pleasure they felt at seeing the union of France and England every day more strengthened, and of thanking the Foreign Commissioners for their ready assistance on the occasion.

I considered it my duty to reply publicly to this speech, and I feel assured that your excellency will not disown my words, when, in the name of France, I said that every friend of civilisation must take a lively interest in the work of an Association whose object was the diffusion of science into every class of society; that France was not less anxious than England to see all her children, the poorest as well as the richest, enjoying the benefit of a sound moral and practical education, fitted for their respective positions; that in this path of peaceful conquest the progress of each was a benefit to all, and that England as well as France was fulfilling a great and noble duty in applying herself to the general development of the cultivation of the intellect; that the means of action at our disposal at the present day are more powerful than those of other nations, whether ancient or modern; and that, thanks to the intimate alliance of the two countries, not only in the dangers of war but in the works of science, literature, arts, and industry, France and England have a more extended future than their illustrious predecessors the Romans, for never, like them, will they be overwhelmed by the engulphing flood of the semi-barbarous tribes of Tartary. Europe will not again be plunged into the darkness of ignorance as in the time of Attila; and our two nations, in extending over the whole world not a material dominion but a moral influence, must soon accomplish the glorious destiny which Providence has reserved for them.

I regret, Sir, that I have been unable to devote more time to the duties which you have done me the honour to impose upon me, but my duties in the University render my presence necessary at the Sorbonne, and I, therefore, must reserve to another period a deeper examination of some of the questions, upon which it is my desire hereafter to enter in a more complete manner.

I have the honour to be, with respect, Sir,
Your Excellency's most obedient servant,
Le Doyen de la Faculté des Sciences de Paris,
MILNE-EDWARDS.

PARIS IMPROVEMENT COMMITTEE.

Society of Arts, Manufactures, and Commerce, Adelphi, London, 9th August, 1854.

SIR,—I am directed by the Council of the Society of Arts to inform you, that they have considered that great public advantage would arise from contrasting the Architectural State of Paris with that of London, and that the next few months will present a very opportune time for investigating the subject. They have accordingly passed a Resolution to the following effect:—

Resolved—That the following gentlemen be requested to act as a Committee to consider the improvements which are in progress in the City of Paris, ascertain the cost and the system on which they are paid for, and report what suggestions they appear to offer for the improvement of the Metropolis, especially with reference to the Thames and the principal thoroughfares of the Metropolis:

Thomas Baring, Esq., M.P.
Lord Berriedale.
Thomas Brassey, Esq.
J. B. Bunning, Esq.
Sir John Burgoyne, G.C.B.
Edwin Chadwick, Esq., C.B.
The Chairman of the Westminster Improvement Commission.
Henry Cole, Esq., C.B.
Lewis Cubitt, Esq.
The Right Hon. B. Disraeli, M.P.
Lieut.-Col. Eardley-Wilmot, R.A.
Viscount Ebrington.
Charles Geach, Esq., M.P.
G. Carr Glyn, Esq., M.P.
George Godwin, Esq., F.R.S.
Earl Granville.
The Right Hon. J. W. Henley, M.P.
H. T. Hope, Esq.
Richard Jebb, Esq.
Joseph Kay, Esq.
Joseph Locke, Esq., M.P.
George Moffatt, Esq., M.P.
Sir William Molesworth, M.P.
Sir Joseph Paxton.
S. M. Peto, Esq., M.P.
W. H. Prescott, Esq.
Samuel Redgrave, Esq.
William Tite, Esq., F.R.S.

I am to express the hope of the Council that you wil accede to their request and allow yourself to be named on this Committee, and I am to assure you that if you will have the kindness to consent to their wishes, they will take every means for economising your time and trouble in the matter.

I have the honour to be, Sir,
Your most obedient servant,
P. LE NEVE FOSTER, Secretary.

The Secretary has received replies from the following gentlemen consenting to serve on the Committee:—

Lord Berriedale.
J. B. Bunning.
E. Chadwick, C.B.
The Chairman of the Westminster Improvement Commission.
Henry Cole, C.B.
Lewis Cubitt.
Viscount Ebrington
George Godwin.
H. T. Hope.
Sir Joseph Paxton.
S. M. Peto, M.P.
S. Redgrave.
W. Tite, F.R.S.

IMPROVED SYSTEM OF MEASURES, WEIGHTS, AND MONEY.

BY LIEUT.-GENERAL SIR C. W. PASLEY, K.C.B., R.E., F.R.S., &c.

PRELIMINARY OBSERVATIONS.

The Duke of Wellington, as Master-General of the Ordnance, having giving orders, in 1825, that practical architecture should form part of the course of instruction of the junior officers attending the Royal Engineer Establishment at Chatham, under my direction, which had hitherto been confined to their duties in the field, and a professor in every respect competent having been selected for that duty, I was induced to enter into the details of measuring and estimating buildings and other works myself, which I had never done before, because, like other officers of my corps, who studied the other branches of practical architecture and engineering with pleasure, I had, when employed in garrison duties, left those details to the clerks of works, and to the overseers and foremen of the department.

In this inquiry, being entirely new to the subject, I soon found that the rules for measuring and estimating every description of artificer's and labourer's work, were embarrased by unnecessary and even absurd difficulties, arising partly from the complexity of our national measures and weights, and partly from the nature of our coinage, in both of which decimal are intermixed with duodecimal and binary subdivisions of the discordant units assumed for measuring and pricing workmanship and materials. These gratuitous and preplexing difficulties, which escape the observation of young men educated at preparatory schools for those professions, and articled at the age of 18 or 19 to civil engineers, architects, and surveyors, as well as of the operative mechanics employed under their direction, who are apprenticed to their respective trades at a much earlier age, struck me so very forcibly, that I saw the necessity of getting rid of them; and in the hope of effecting that object, after having paid the greatest attention to the subject for at least five years beforehand, I published a small volume in 1834, entitled "Observations on the Expediency and Practicability of Simplifying and Improving the Measures, Weights, and Money used in this Country, without materially altering the Present Standards," in which, besides an entire revision and reform of the whole of these standards without exception, such as had never been suggested before, I was also the first in this country to recommend a decimal system of money of account, and a decimal coinage, based on the pound sterling as the unit, which I proposed to subdivide into 10 tenth-parts of a pound, 100 cents, and 1000 thousandth parts, the two first to be brought into circulation by new silver coins, the last by new copper coins, on the same principle as that recently recommended in the report from the Select Committee of the House of Commons of the 1st of August, 1853.

It will be seen by the two first pages of my preface that I had embodied the substance of my ideas in a small pamphlet, of which twenty-four copies were lithographed for private circulation, and presented in May 1831, to H.R.H. the Duke of Sussex, then President of the Royal Society, and to a number of gentlemen, chiefly Fellows of that Society, and which was publicly read by Mr. Archibald Robertson, as Secretary of the Philosophical and Literary Institution of Chatham and Rochester, at their meeting of the 5th of July of the same year, as one of the first original papers presented to that Institution, and thus it was made so very public, that any person residing in London who took an interest in the subject could easily become acquainted with my ideas.

Hence, when I discovered that in the next number of the *Westminster Review* for January, 1832, published only six months afterwards, the author of an article on weights and measures, which had long ceased to be a subject of public interest, had thrown out suggestions of improvement not merely similar to, but almost identical with mine, in reviewing a pamphlet that had been published by John Wilson, of Thornly, a Director of the Chamber of Commerce of Glasgow in 1823, the merits of which had been discussed by a Select Committee of the House of Lords in the same year, and which did not contain a single idea in unison with mine, I was, of course, very much surprised at so extraordinary a coincidence. It is, however, well known to many gentlemen now living, who received copies of my pamphlet in 1831—amongst others, to Colonel Sir William Reid, of the Royal Engineers, now Governor of Malta, and to Mr. Archibald Robertson, then Secretary of the Institution before-mentioned—that I did not copy from the reviewer. Whether he copied from me or not, is a matter of very little importance to the public, excepting that it is desirable that those individuals, who are the first to propose any useful improvement or new system which gradually makes its way, and may eventually be adopted with benefit to the country, should have the credit of priority of invention.

When I obtained my commission, in December, 1797, I had not the smallest intention of ever becoming an author, the only objects I had at heart being the success of the war, upon which the safety of the nation depended, and the improvement of the Royal Engineer Department, which, after having been present in two battles and as many sieges, appeared to me to be so badly organised, that I considered that a British army, though more than a match for the troops of any other nation in battle, must either fail in a war of sieges, or purchase success by a lamentable loss of life. This induced me to write my "Essay on the Military Policy and Institutions of the British Empire," the first part of which, relating to the policy, was published at the close of the year 1810, just as the British army had retired into the lines of Torres Vedras, after the Battle of Busaco, in which I recommended the entire abandonment of the feeble system of desultory expeditions with small armies, ending in retreat, re-embarkation, and disgrace, and of defensive warfare altogether; and that we should step boldly forward as principals in the war on the Continent, and, at the time being, employ the immense disposable force of regular troops which we had in constant pay, in a vigorous attack on the enemy in the Spanish Peninsula, the only part of Europe where we then had any allies in arms.

In writing the second part of my Essay on our Military Institutions, which had been promised to the public, and was ready for the press early in 1811, one of my chief objects was to induce the Government, by the force of public opinion, to take steps for the better organisation of the important department to which I belonged, but in the course of that year Lord Mulgrave, then Master-General of the Ordnance, and General Mann, then Chief-engineer or Inspector-General of fortifications, not only received my representations courteously, as their predecessors had done, but even encouraged me to draw up a plan of improvement, which was adopted next year, on their recommendation, in consequence of the powerful influence of the Duke of Wellington with the administration of that day, as soon as the failures and disasters of the first sieges in Spain had made him fully aware of the necessity of it; for, strange to say, though the inefficiency of the department had long been felt, and deeply lamented by those officers of the corps then captains of engineers, who like myself had commenced their military career after the war of 1793 broke out, it was less felt by the senior officers of the corps, and had entirely escaped the observation of the rest of the army. The Duke's urgent representations of the necessity of instructing the officers of engineers in siege operations before they were sent on service, and of having a corps of Sappers and Miners attached to the department, were no sooner communicated to the Earl of Liverpool, by a letter from Frenada of the 12th of February, 1812, than full powers were given to the Master-General to carry the desired improvement into effect, which was done at the Royal Engineer Establishment at Chatham, formed for that purpose, of which I had the honour of being appointed the first director in May, 1812. Under these circumstances, I first postponed and then finally abandoned, of my own accord, and not at the request of my superiors, as has been erroneously supposed, all intention of publishing the second part of my essay; for as the only object I had in view in writing it was accomplished, it had become not only unnecessary, but would have been highly improper, to make known to the world in time of active war, the lamentable inefficiency of the corps to which I belonged, after the most vigorous efforts for improving it were being made by the Government. The evils which would have formed a prominent part of the subject of the second part of my essay, were however afterwards explained in the able and interesting Journal of the Sieges in Spain, published by my late distinguished brother officer, Sir John T. Jones; but he, too, from the same sense of duty that kept me silent, did not publish them until after the peace of 1814, though penned the year before.

I mention these facts not out of egotism, but in order

that it may be understood that I never wrote on any subject, literary or scientific, unless it had a practical bearing on the safety of the nation in time of war, or on the duties of engineer officers. It was only my analysis of the customary system of measuring and estimating buildings and works, adopted by the architects and engineers of this country, that induced me to enter into the study of measures and weights at all; and, as a necessary consequence, to compare our own standards with the decimal metrical system adopted in 1793 by the republican government of France, on the recommendation of the *Academy of Sciences and Arts of Paris*, to whom the question of uniformity of weights and measures had previously been referred in 1789, the standards of which were afterwards determined in reference to the length of the seconds pendulum, and to the mean length of the terrestrial meridian, by select members of the same learned society. After practically investigating the subject of weights and measures in all its bearings as applied to navigation, architecture, and the mechanical arts, to commercial transactions, and to the daily business of life, I came to the conclusion, that the purely decimal system of those celebrated French philosophers was one of the most injudicious that could have been adopted.

Objections to the French metrical system. That it has proved an entire failure as regards astronomy and navigation. That, instead of producing uniformity, it has caused much greater confusion in the weights and measures of France than had ever prevailed before; and that, except in government transactions, it remained inoperative for half a century after the first attempt was made to establish it by law.

To say nothing of the glaring absurdities of the republican calendar, the French decimal metrical system was founded on a new division of time, in which the mean solar day was divided into ten hours of 100 minutes and 1000 seconds each, instead of 24 hours, of 60 minutes and 3600 seconds each; while the quadrant of the circle and of the serrestrial meridian were divided into 100 degrees, of 100 tminutes and 1000 seconds each, instead of 90 degrees, of 60 minutes and 3600 seconds each. At the same time the 10-millionth part of the mean length of the terrestrial meridian was established as the unit of all lineal measures; a standard purposely adopted as being incommensurable with all former standards, and was called the *Metre*—a name derived from the learned languages—also purposely chosen in order to obliterate the names of all former lineal measures. Its decimal submultiples, derived from the Latin, were called the *Decimetre*, *Centimetre*, and *Millimetre*; and its decimal multiples, derived from the Greek were called the *Decametre*, the *Hectometre*, the *Kilometre*, and the *Myriametre*, which rendered this new system perfectly unintelligible to the population of France; for even to classical scholars the multiples of the metre are more perplexing than tens of metres, hundreds of metres, thousands of metres, and tens of thousands of metres would have been. In like manner the standards of measures of surface, and of capacity or solidity, as derived from the metre, as well as the standards of weight, which were fixed in reference to the weight of one cubic decimetre of water, were all expressed in words taken from the ancient Greek and Latin, and embarrassed by the same pedantic prefixes from the dead languages for their sub-multiples and multiples. Even though well versed in Greek and Latin, no officer of the British army or navy, and no English architect, can read the modern French books on fortification or gunnery, or on architecture or civil engineering, in which the decimal weights and measures are used, without having printed tables by him to refer to; though he may easily remember the simple proportions, which the toises, feet, and inches, and the pounds and ounces of the former legal standards of France have to English fathoms, feet, and inches, and to pounds and ounces avoirdupois, and compare them with sufficient accuracy by mental arithmetic, without referring to any tables at all. In short, the much vaunted decimal metrical system of the French republic may justly be considered the bathos of legislation, for it was a vain attempt to annihilate all men's former notions of time and space; and, though planned by some of the most eminent astromers of France, it has proved a perfect failure, for the master mariners, as well as the seamen of that country, rejected from the first the decimal divisions of time, and of the circle, of which they soon found out the absurdity, even as applied to the theory of of astronomy.* And they no less peremptorily rejected the decimal degrees of the terrestrial meridian of 100,000 metres, or 100 myriametres each, and the decimal minutes of the meridian of 10,000 metres or 10 kilometres each, and the French pilots rejected with disdain the smaller decimal parts of the same new-fangled measures for the length of their log lines, and for their soundings, as well as the decimal division of the horizon into forty rhumbs instead of the thirty-two points of the compass.

To be continued.

TECHNICAL DICTIONARY.†

In these days of rapid and constant intercommunication between nations, the difficulty of understanding terms of arts or the technical words of a trade, meets the traveller at every turn. Nor is this confined to travellers; every one who desires to keep himself well up in what is doing in science or art, by reading the various works, periodical and others, which are daily appearing, finds himself constantly puzzled by some technical word, for which the dictionary affords no explanation whatever. It is not the custom to review books in the Journal, nor is it intended to do so now, but the members of the Society for the Encouragement of Arts, Manufactures, and Commerce, are so much interested in this matter, that it is conceived not to be out of place to call their attention to a work lately published on a principle promising to remedy the want alluded to. It is termed a technological dictionary, in three languages, and has for its object to place in juxtaposition equivalent technical words in French, English, and German, to explain their various meanings, and point out in what arts or trades they are employed. The idea is excellent, and the plan

* In the year VII. of the French republic, 1799, Citizen Fleurieu, formerly the Count de Fleurieu, who had retired from public life for several years after the death of Louis the Sixteenth, of whom he was one of the most faithful adherents, was appointed by the *National Institute of Sciences and Arts*, and by the *Bureau of Longitudes of Paris*, of both of which he was a member, to inquire into and report upon the applicability of the decimal metrical system to astronomy and navigation. Having entered the navy at an early age, and served with distinction in the seven years' war, and made voyages on purpose to test chronometers improved at his suggestion, and afterwards having held the important office of Director General of the Ports and Arsenals of France from 1776 to 1790, when he was appointed Minister of the Marine, from which he was removed next year by the revolutionary leaders of that day; and being one of the most scientific and skilful hydrographers of the age, and second to few, if any, of his countrymen, in the knowledge of astronomy, which he had always applied to the purposes of navigation, his official report on the important subject of inquiry with which his colleagues had interested him, as contained in the fourth volume of the account of a voyage round the world, by Etinne Marchand, in the years 1790, 1791, and 1792, of which he was the editor, prevailed over the theories of the more celebrated astronomers of 1793, and gave the death-blow to the absurdities of the decimal divisions of time and the circle, and of the terrestrial meridian; and from that period the vain and impotent attempt to induce the mariners and pilots of France to adopt them was abandoned; but this important service rendered to his country by Fleurieu is kept in the background in the account of his life in the *Biographie Universelle*, because few Frenchmen like to confess that the decimal metrical system of the revolution, which was professedly intended for the imitation of all mankind, has been as great a failure in science as its other theories have been in legislation.

† Dictionnaire Technologique Français-Anglais-Allemand. Par MM. Tolhausen, Freres, et Gardissal. Premiere Partie. Paris, Brussels, New York.

of the work good, such a book has long been wanted, and when it is carefully re-edited it must become a necessary companion to the library table of all whose habits, tastes, or necessities lead them to take an interest in the progress of Arts, Manufactures, and Commerce. It is obvious that such a work needs the labours of many to make it anything like complete; it requires the combined learning and experience of those of each country engaged in the various arts; no one mind, however skilled, is competent to the task. The book which is the subject of this notice is a goodly volume of some four hundred pages, and, imperfect as it is, and necessarily so at first, it is not without its value. It has a German and French editor, and the English portion of the book is full of mistakes, both in terms and in spelling; scarcely a page can be opened without one, and yet, notwithstanding all this, the book will be of great help to those who have to deal with foreign technical terms. It requires careful revision by men of the different nations well versed in their separate specialities. Such mistakes as the following would not then occur. The quotations are taken at random, as the pages are opened. Thus, *Pendule a grille* is translated "Roast pendulum," meaning the well-known form of compensation pendulum technically called a "gridiron pendulum." Again, *Calorique rayonnant* is translated "streaming" instead of "radiant" heat; *Foret a l'archet*, meaning a "bow drill," is translated "drill with a ferule." English words, too, are constantly misspelt, to say nothing of others which are coined to meet the occasion, whilst frequently the explanation of the French term is a ludicrous literal translation from the German. Notwithstanding all these faults, there is much merit due to the editors for having undertaken it. It points to filling up a void which has for some time existed; and if those who may use the work will take the trouble to comply with the wishes of the editors, expressed in the conclusion of the preface, they will be doing good service:—"We beg our readers to communicate any omissions which they may remark; they will thankfully be received, with every desire to improve this novel work which we have undertaken in the hope of being useful."

COMMISSIONERS OF PATENTS.

Extract from the Report Presented to Parliament, 7th August 1854.

"In pursuance of several orders of the Commissioners of Patents, the whole business of the Commissioners relating to patents, from the petition for the allowance of provisional protection to the printing, publication, and sale of the specification, is now conducted in one office.

The office of the Commissioners is in Southampton-buildings, Chancery-lane, in a set of chambers lately occupied by the Masters in Chancery, and is open to the public from ten to four o'clock every day.

The number of applications for provisional protection recorded within the fifteen months, from the 1st October 1852 to the 31st December 1853, was 4,256; the number of patents passed thereon, all having become due on the 30th June last, was 3,099; and the number of applications lapsed or forfeited, the applicants having neglected to proceed for their patents within the six months of provisional protection, was 1,157.

The number of applications recorded within the first three months of the operation of the Act was 1,211.

The number of applications recorded within the year 1853 was 3,045.

Though the Act received the royal assent on the 1st July 1852, yet its operation was deferred to the 1st October following. During the intervening period almost all applications for patents were suspended, and this sufficiently accounts for the large number of applications (1,211) recorded within the quarter ending 31st December 1852, as compared to the number (3,045) recorded for the whole year 1853.

The number of applications recorded in the first six months of the current year was 1,440, showing a probable decrease of 165 applications upon the year 1854, as compared to the number of the year 1853.

All the specifications filed in the office upon the patents passed under the Act, from 1st October, 1852, to the 30th June last, 3,099 in number, have been printed and published, together with lithographed outline copies of the drawings accompanying the same; and these are sold to the public, either separately or in the series for the year, at the cost price of the printing and paper. The price of a specification of the average length of letter-press, and drawings, is Eightpence.

There is no arrear in the printing and publication of the specifications filed since the commencement of the Act. Each specification is printed and published within three weeks of its deposit in the office.

Under the 15 & 16 Vict. c. 115. s. 4, a printed copy of the specification, duly certified and sealed in the Commissioners' office, may be received in evidence of the original document in any Court within the United Kingdom of Great Britain and Ireland and the colonies; the printed copy is certified on payment by the applicant of one shilling for the seal, and the charge of the draughtsman for colouring the prints of drawings is paid by the applicant.

Printed certified copies of all the specifications filed in the office, from the 1st October 1852 to the present time, with coloured printed copies of the drawings, have been sent to the office of the Director of Chancery in Edinburgh, and the enrolment office of the Court of Chancery in Dublin, pursuant to the Act, 1852, and the Act 16 & 17 Vict. c. 115; and such copies are open to the inspection of the public in the respective offices.

Certified copies of all the patents passed since the commencement of the Act, and certified copies of the record books of assignments of patents and licenses, with copies of such assignments and licenses, have also been sent to the Chancery offices in Edinburgh and Dublin, pursuant to the Act.

The whole series of specifications of patents for reaping machines, and the drawings accompanying the same, from the first enrolled, 4th July, 1799, to the present time, have been printed and published, and are sold at the cost price of the printing and paper, either separately, or altogether, with an appendix, in one volume. The appendix, compiled by Mr. Woodcroft, from a great variety of authorities and works, describes the instruments for reaping grain, published and in use, from the earliest period to the present time.

The whole series of specifications of patents for firearms, cannon, shot, shell, cartridges, weapons, accoutrements, and the machinery for their manufacture, and the drawings accompanying the same, from the earliest recorded, 15th May, 1718, to the present time, have been printed and published in like manner. An appendix is in preparation, and will shortly be published.

The Secretary of State for the Home Department has required the publication of all the specifications of patents for the consumption of smoke in furnaces, and for the making of drainage tiles applicable to sewerage; and the Board of Admiralty has required the publication of the specifications of patents for improvements in propelling ships: these three subjects are now in preparation.

Pending the publication of the old specifications, necessarily a work of time, printed certified copies for evidence in courts of justice, for counsel, and for other purposes, of any of the old specifications, may be obtained on application at the Patent Office, the applicant paying the cost of putting the drawings upon the stone and colouring the number of prints he may require, and the Commissioners paying the cost of letter-press and paper, or, in the absence of drawings, the applicant paying the cost of letter-press and paper; by this arrangement the applicant obtains twelve or fourteen certified printed evidence copies at a low price, and the Commis-

sioners obtain the prints of drawings, or the letter-press and paper, for their future publication of the specification, free of cost. 100 old specifications have been printed in this manner within the last few months.

Mr. Woodcroft's chronological and alphabetical indexes of all the specifications of patents enrolled in Chancery, from 1617 to the 1st October, 1852, 14,359 in number, have been published in three imperial octavo volumes, and are sold at 50s., the cost price of printing and paper. Mr. Woodcroft's index, arranging these specifications according to the subject matter, is in the hands of the printer, and will shortly be published.

Indexes in the same chronological, alphabetical, and subject-matter form of all the specifications filed in the office under the new law, will be made in continuation, and published periodically.

The prints of specifications, the indexes, and all other printed papers will in future be sold in the Patent Office, and not at the Queen's Printers as heretofore. The publications are sold to all persons applying for them at the cost price of each, and no trade discount is allowed. Booksellers and agents, however, charge a commission to the persons for whom they purchase these works.

The Commissioners have established a public library of research within the Patent Office, to consist of the scientific and mechanical works of all nations; convenient rooms are provided for the purpose, and the library will be open to the public within a few weeks.

A journal, entitled "The Commissioners of Patents Journal" has been published twice a week since the commencement of the present year, and it will be continued. It contains the various notices appearing in the *Gazette* on the subjects of patents, and a variety of other notices and useful information and instruction for the guidance of applicants in proceeding for their patents. It is proposed to publish in the journal the names of patentees, and the titles of patents granted in other countries; also a notification from time to time of the date of the expiration of each patent as it may become void, either by reason of nonpayment of the stamp duties of *50l.* and *100l.* at the expiration of the third and seventh years respectively, pursuant to the Act, or at the full term of fourteen years; and also from time to time a list of the inventions provisionally protected, lapsed or forfeited by reason of the applicants having neglected to proceed for their patents within the six months of provisional protection. The price of the Journal to subscribers is *30s.* per annum.

Home Correspondence.

SIR,—What is the best thing to *preserve* polished steel grates when out of use?

Yours,
INQUIRER.

Oswestry, Sept. 3, 1854.

DEAR SIR,—I send you a specimen of cheap literature, "The Man of Ross," a paper published monthly, and sold at one penny, or stamped twopence. It is very extensively circulated, and, as you will perceive, it contains articles of science, amusement, general information, local intelligence, and advertisements. It serves the purposes of a newspaper in a thinly-peopled agricultural county, and both the historical and scientific articles are illustrated by very respectable engravings. The way in which the publishers manage to give so much for a penny, when one of the engravings in the number I send you costs £26, is this:—The body of the paper is printed in London; the external or advertisement sheet is printed at Ross, where I bought it the day after I heard Cardinal Wiseman's lecture on the subject of cheap reading for the people. This outside sheet, you will observe, not only contains local news, but local literature also, besides advertisements of the town and neighbourhood, with a few London specimens of advertising talent. The same paper appears at Hereford with a different outside sheet, as the *Hereford Advertiser*, and at other provincial towns on the Welsh border it takes other names, with the local news and notices on the fly-sheet. Here, then, a way is devised to employ London literary and artistic talent for provincial edification. The paper so produced is a curiosity in its way, and probably the Cardinal was not aware of such a system of publishing works for the people.

I am, dear Sir, yours truly,
JOSEPH GLYNN.

Westbourne Park Villas, London,
August 28, 1854.

LIST OF LECTURERS.

SIR,—On reading the letter signed "Robert Dalgleish," of Leek, contained in your last number, it strikes me he goes a little too far in his condemnation of gratuitous lectures. My experience, at least, has led me to a very different conclusion. Two-thirds or more of the lectures delivered to the members of this Institute are gratuitous ones, and I believe the greater part of them are more calculated to benefit Institutions such as ours, than those given by professional lecturers, who are generally too fond of using hard words and technical phrases, which a rustic audience cannot understand. Instead, therefore, of complaining of the Society of Arts having included in their list the names of many gentlemen who are willing to give gratuitous lectures, I think that the most valuable information it contains. Professional lecturers will generally take care that you know where to find them; every post brings us offers of their services, which, in many cases, we cannot avail ourselves of for want of funds; but it has not been easy to find those friends of education who would lecture for nothing, or for their travelling expenses only, but who, of course, never advertise.

Lectures, by whomsoever delivered, are, however, but of little use only so far as they induce those who hear them to study the subjects at home. I do not wish to undervalue them as a means of instruction, but I believe that it is in this way only that they are capable of doing much good.

I am, Sir, yours respectfully,
FREDERICK PARKER,
Hon. Sec.

Baker-street and High Peak Institute,
Baker-street, Aug. 23, 1844.

Proceedings of Institutions.

GATHERING OF LITERARY AND MECHANICS' INSTITUTIONS.—A gathering of Literary and Mechanics' Institutions took place at Worsley Hall, near Manchester, the seat of the Earl of Ellesmere, on Saturday afternoon, for the double purpose of securing a friendly and social reunion of such people, and of aiding a fund to purchase a library for what is termed the Institutional Association of Lancashire and Yorkshire. The meeting was under the joint management of Dr. Hudson, of the Manchester Athenæum, and the secretary of the Manchester Mechanics' Institution, who made arrangements with the London and North Western and East Lancashire Railway Companies to carry passengers upon a scale which would leave a handsome profit to the Institution. About two thousand persons assembled at Worsley in the afternoon, from Manchester, Congleton, Macclesfield, Staleybridge, Stockport, Ashton, Oldham, Colne, Burnley, Accrington, Bacup, Newchurch, Bury, Bolton, Stoke, Radcliffe, Heywood, and some thirty other places.

POOLE.—An Exhibition in connection with the Poole Literary and Scientific Institution, was opened at the Town Hall, on Saturday the 19th inst., under the auspices of a

committee of gentlemen residing in Poole. The Exhibition consists of works of industry, art, manufacture, commerce, mechanical inventions, and objects illustrative of taste and skill in the application of human industry. Eighty-two persons have contributed objects, of whom sixty-five reside in Poole and its immediate neighbourhood. The walls of the Council-chamber, as well as those of other rooms, were decorated with Photographic views and specimens of Nature-printing, contributed by the Society of Arts, in addition to which a portfolio containing a series of photographic views of Constantinople and its environs, and deposited by A. H. Layard, Esq., M.P., and some specimens of Daguerreotypes executed by J. W. Justican, of Poole, were exhibited. The agricultural and raw produce of the district, as well as the rope manufacturers of Poole, which have obtained a wide reputation, were well represented. Some specimens of pottery and terra cotta, manufactured from clay obtained from the surrounding neighbourhood, were also exhibited. The Press, a somewhat novel feature, was duly represented in the Exhibition. The papers consisted of the *Morning Intelligencer* and *General Advertizer* for 1784. The *Morning Herald* for 1788, 1799. The *Argus*, 1791. The *Star*, 1792. The *Morning Chronicle*, 1788—1793. Mr. H. M. Aldridge deposited the *Sherborne Mercury* of 1737. There were also numerous specimens of jewellery, time-pieces, models of steam-engines and yachts, fire-arms, fancy needlework, urns and vases, brushes, piano-fortes, furniture, and fancy articles, &c. The receipts have relieved the promoters from all fears on the ground of expense.

MUCH WENLOCK.—The fifth annual meeting of the Olympic Class of the Wenlock Agricultural Reading Society was held on the 22nd ult., under the presidency of W. P. Brookes, Esq. The class assembled at half-past nine o'clock in the morning, in the Corn Market, and proceeded to the ground, kindly lent by Mr. Ainsworth, accompanied as on former occasions, by a band of music, banners, and implements of the games. Previous to the commencement of the games, the President addressed the meeting, and said—"My friends, there is no country in the world where the noble and the wealthy take so deep an interest in the welfare and happiness of the working classes as in England, or where the working classes regard their superiors in station with so much attachment and respect. It is to this circumstance, as well as to the liberty and order which our glorious and time-honoured constitution secures to us that I attribute the contentment, the mutual confidence, and hearty co-operation for the public weal that prevail among all classes in this favoured country. The inhabitants of Wenlock have received frequent proofs of the kindness and liberality of the surrounding nobility and landed proprietors, who, with the members for the borough and this division of the county, are contributors not only to the school for the early education of the poor, but to our public library and reading rooms, to the games we are met this day to celebrate, and to the other amusements of the place. I am glad to observe that the opinion is fast gaining ground that occasional recreation is not only merited by, but is desirable, nay, requisite, for the working classes; and that public holidays should be appointed by the legislature for this purpose. There are persons—but, I am happy to say, very few—who entertain the notion that the daily labour a working man has to undergo is a sufficiently healthy exercise for his body. But surely there is a vast difference between the yearly round of excessive, dull, wearying toil imposed by stern necessity on the labourer, with his often long morning and evening walk to the scene of his occupation, and the cheerful and invigorating exercise of our old English pastimes. I would tell these objectors to the humble amusements of the poor that it is their interest, in a sanitary point of view, to encourage and support public games. The spark which falls harmlessly on a compact building of stone or brick may set fire to the combustible materials of a ruinous or ill-constructed cottage, and thus involve a neighbouring stately edifice in its destructive flames. And so it is with disease: the secret poison that comes wafted in the air generally first takes effect on systems debilitated—by whatever cause, excessive fatigue among others—and thus acquires a contagious virulence to which the strongest constitutions fall an easy prey. If, therefore, recreation tends to promote, as I hold it does, the public health, it becomes alike the duty and the interest of all classes to countenance and support occasional out-door games; and I trust that the efforts of the inhabitants of other parts of the county to establish them will be as well supported as at Wenlock. I wish to inform the meeting that the prizes for writing, arithmetic, and recitation, will be awarded in the Reading Room, at one o'clock; also that it is proposed to give prizes for drawing, history, and geography next year; the object of this class of the Reading Society being to encourage and reward not merely skill in athletic sports, but superiority in intellectual attainments. I congratulate you on the increase in the amount of your subscriptions for the present year, and offer you my best thanks for the continued prosperity of the class. You will all of you, I am sure, be much gratified, as I am, to see our respected curate, Mr. Heywood, on the field, evincing by his presence his approbation of and interest in the innocent amusements of his flock. The president concluded by proposing three cheers for Lord Granville, Lord Forester, Lord Wenlock, Sir Watkin Williams Wynn, the County and Borough Members, and other gentlemen who contributed to the games, which was heartily responded to. The Rev. Mr. Heywood then addressed a few words to the meeting, after which the games commenced with—1. Quoits. 2. Leaping in height. 3. Leaping in distance. 4. Foot race, for boys under fourteen years. Prize, a book. 5. Foot hurdle race; distance, one mile. Open to all. Prize, £2. 6. Foot race, half a mile. Prize, 10s. 7. Foot race, for boys under ten years. Prize, a book and the olive crown. 8. Foot race of 200 yards, for residents in the borough. Prize, 10s. 9. Foot race of 200 yards, for residents in the parish of Much Wenlock. Prize, 10s. 10. Wheelbarrow race, competitors blindfolded. Prize, 7s. 6d. 11. Jingling match. Prize, 5s. 12. Two games of foot-ball. The proceedings concluded with prizes for recitations and arithmetic.

WOLSINGHAM.—The first course of lectures delivered before the Mechanics' Institute and Literary Society, was brought to a close on Thursday, the 15th ult., when a considerable number of the members and their friends assembled in the Town Hall. Mr. Joseph Snowball occupied the chair, and called upon Mr. John Davison, jun., one of the vice-presidents, who delivered a very able and lucid lecture on the "Five Senses," which was listened to with great interest, and at its conclusion a vote of thanks was proposed to Mr. Davison, by Mr. John Moody, seconded by Mr. John Lee, and carried by acclamation. The following is a list of the lectures delivered during the session, which commenced on the 9th of February, 1854, with an introductory lecture by the Rev. Joshua Elliott, of Tow Land. "On the Anatomy of the Human Frame," by Mr. John Davison, jun.; "On the Physiology of the Human Frame," by Mr. John Davison, jun.; "On Genius," by the Rev M. Randles; "On Pompeii," by Mr. Thomas H. Bates; "On the First Principles of Astronomy," by the Rev. J. F. Turner; "On Elementary Chemistry in relation to Mines," by Mr. John Madden; "On Self-Culture," by the Rev. Thomas Cardwell; "On Ethnology," by the Rev. S. M. Mason; "On the Pictorial Works of Hogarth," by Mr. Thomas H. Bates; concluding with "The Five Senses: Hearing, Sight, Smell, Taste, and Touch," by Mr. John Davison, jun.

Miscellanea.

BELLOT TESTIMONIAL.—The Committee appointed by the General Meeting assembled to do honour to the memory of the

late Lieutenant Bellot, who perished in the Arctic seas, have informed the subscribers that a sum of about 2,000*l.* has been realized. Of this sum 500*l.* will be applied to the erection of a granite obelisk on the wharf of the Royal Hospital, at Greenwich; the Commissioners of that great national establishment and the Lords of the Admiralty having given their unqualified sanction to the request of the subscribers to have the monument so placed. The remainder of the money will be equally divided among the five sisters of the gallant French officer; two of whom, being already of age, have had certain sums paid to them *ad interim*. The position of the obelisk on the right bank of the Thames, immediately to the east of the much-frequented Greenwich steam-boat pier, will be such that it must be well seen by every passer-by, whether he be on the river or on the chief quay of the Royal Hospital. Mr. P. Hardwick, R.A., the architect of that establishment, has kindly undertaken to superintend the erection of the monument the granite of which is in the course of preparation by Messrs. Macdonald, of Aberdeen.

THE PAPER DUTY AS AFFECTING THE MANUFACTURE OF PAPIER MACHE.—During a recent visit to the manufactory of Messrs. Jennens and Bettridge enquiries as to the contents of a number of large boxes which were being sent off to Piedmont, in Italy, elicited a fact which might be made good use of by those who are agitating for a repeal of the duty on paper. These boxes contained panelling for railway carriages—one of the most novel of the many purposes, and yet perhaps one of the most important, to which papier maché is being adapted by the firm referred to. Certainly their appearance, a mere compact slab of brown paper, contrasted most strangely with the *chef d'œuvres* of the japanner's art and ornamentists; but bearing in mind that the material is superior to wood in many respects—in non-liability to contract, warp, or split, (all know that splinters are the most disagreeable accompaniments of railway collisions,) and in durability—the hindrance which the paper duty offers to its being generally used by the makers of railway carriages, naturally excited much interest. The duty amounts to about 3d. a foot, and this is sufficient to prevent the order being given to the papier mache manufacturer in cases where cheapness is the main consideration, as indeed it must be in all large orders. It therefore operates in favour of an inferior quality of material being used, viz., papier mache made from pulp—which is not subject to duty when of more than quarter-inch thickness—and also limits the demand for an article which, if generally brought into use, would give employment to hundreds of men in Birmingham alone. Even now there are said to be on hand orders amounting to some fifty or sixty thousand feet, probably containing upwards of twenty tons of paper. Hitherto it has been almost solely employed upon foreign railways.

PATENT LAW AMENDMENT ACT, 1852.

THIRD SET OF RULES AND REGULATIONS.

Rule VII. of the Second Set of Rules and Regulations of the Commissioners, dated the 15th October, 1852, is hereby rescinded.

I. Every application for Letters Patent, and every title of invention and provisional specification, must be limited to one invention only, and no provisional protection will be allowed or warrant granted where the title or the provisional specification embraces more than one invention.

II. The title of the invention must point out distinctly and specifically the nature and object of the invention.

III. The copy of the specification, or complete specification, directed by the Act 16 & 17 Vict. c. 115, sect. 3, to be left at the office of the Commissioners on filing the specification or complete specification shall be written upon sheets of brief or foolscap paper, briefwise, and upon one side only of each sheet. The extra copy of drawings, if any left with the same, must be made as heretofore, and according to the directions contained in Rule III. of the Lord Chancellor, dated the 1st October, 1852.

IV. The copy of the provisional specification to be left at the office of the Commissioners on depositing the same shall be written upon sheets of brief or foolscap paper, briefwise, and upon one side only of each sheet. The extra copy of drawings, if any, left with the same, must be made as heretofore, and according to the directions contained in Rule II. of the Commissioners dated the 1st October, 1852.

V. All specifications, copies of specifications, provisional specifications, petitions, notices, and other documents left at the office of the Commissioners, and the signatures of the petitioners or agents thereto, must be written in a large and legible hand.

VI. In the case of all petitions for Letters Patent left at the office of the Commissioners after the 31st day of December, 1853, the notice of the applicant of his intention to proceed for Letters Patent for his invention shall be left at the office of the Commissioners eight weeks at the least before the expiration of the term of provisional protection thereon, and no notice to proceed shall be received unless the same shall have been left in the office eight weeks at the least before the expiration of such provisional protection; and the application for the warrant of the Law Officer and for the Letters Patent must be made at the office of the Commissioners twelve clear days at the least before the expiration of the term of provisional protection, and no Warrant or Letters Patent shall be prepared unless such application shall have been made twelve clear days at the least before the expiration of such provisional protection: Provided always, that the Lord Chancellor may in either of the above cases, upon special circumstances, allow a further extension of time, on being satisfied that the same has become necessary by accident, and not from the neglect or wilful default of the applicant or his agent.

Dated 1st August, 1854.

The Lord Chancellor has made the following order:—

Every petition addressed to the Lord Chancellor praying for the extension of time for the sealing of Letters Patent, and for the filing of the specification thereon, under the provisions of the Act of the 16 & 17 Vict. c. 115, and the affidavit accompanying the same shall be left at the Office of the Commissioners of Patents. And in every case where the delay in sealing such Letters Patent and in filing such specification is alleged to have been caused by adjourned hearings of objections to the grant of such Letters Patent before the Law Officer to whom such objections may have been referred, the petitioner, before leaving his petition as aforesaid, shall obtain the certificate of such Law Officer, to the effect that the allegations in respect of such adjourned hearings and causes of delay are in the opinion of such Law Officer correct, and that the delay arising from such adjourned hearings has not been occasioned by the neglect or default of the petitioner. And such certificate shall be written at the foot of or shall be annexed to such petition.

17th July, 1854.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Sept. 1st*, 1854.]

Dated 20th June, 1854.

1349. R. Reeves, Bratton Westbury, Wilts—Drills for liquid manure.

Dated 5th July, 1854.

1477. T. Grubb, Dublin—Microscopes.

Dated 6th July, 1854.

1485. W. N. Nicholson, Newark—Hay-making machines.

1490. N. M. Caralli, Glasgow—Manufacture of ornamental fabrics.

Dated 18th July, 1854.

1575. C. M. Archer, 3, St. James's Gardens, Haverstock hill, Hampstead road—Removing, discharging, or obliterating printing, engraving, &c., from paper, and so that the same may be reconverted into pulp, and be again manufactured into paper.

Dated 24th July, 1854.

1623. A. Castets, Manufacturer, Paris—Substance for supplying the place of quinine.

Dated 26th July, 1854.

1617. W. L. Tizard, Aldgate, London—Fermentation, and apparatus for same.

1648. P. V. Delaye, Paris, and 16, Castle street, Holborn, London—Printing blocks.

Dated 28th July, 1854.

1664. R. H. Thompson, Old Charlton, Kent—Sewing machine.

Dated 29th July, 1854.

1679. A. E. L. Bellford, 16, Castle street, Holborn—Engraving. (A communication.)

Dated 8th August, 1854.

1739. A. Ogg, Glasgow—Cementing leather.

Dated 9th August, 1854.

1749. J. Hackett, Derby—Garments, or appendages to garments.

Dated 10th August, 1854.

1750. W. H. Clabburn, Norwich—Shawls and scarfs.

Dated 11th August, 1854.

1752. E. Monson, Birmingham—Cleaning and polishing daguerreotype plates.
1754. J. Reimann and Friedrich Sauermann, Breslaw, Prussia—Fire-arms.

Dated 12th August, 1854.

1760. J. Gibson, Paddington—Railway wheels.
1762. W. Woodcock, Earl's Court Brewery, Brompton—Combustion of fuel.
1764. G. Weston, Sheffield—Veneering apparatus.
1766. J. Petrie, junior, Rochdale—Machinery for drying wool.

Dated 14th August, 1854.

1768. H. L. E. D. Hennebutte, Esquermes lez Lille Nord, and 16, Castle street, Holborn—Varnishes.
1770. P. Haworth, Manchester—Improved belt, band, or strap fastener.
1772. W. Crosland, Hulme—Certain machinery governing speed of steam engines, &c.
1774. J. Beardmore, junior, Stowage, Deptford—Supplying air to furnaces.

Dated 15th August, 1854.

1776. Earl of Aldborough, Stratford lodge, Wicklow, Ireland—Projectiles.
1778. J. W. Taylor and C. Taylor, Nottingham—Adhesive imitation embroidery to lace, muslin, silk, woollen, cotton, or other fabrics.

Dated 16th August, 1854.

1780. J. Coupland, Southampton—Preparation of a pulp to supersede rags in paper manufacture.
1784. F. Higginson, 66, King William street—Aiming with ordnance, ship, garrison, and battering guns, and field pieces.
1786. R. Carr, Shrewsbury road, and W. Crossby, Divison street, Sheffield—Consuming smoke.
1790. J. Lamb and T. Lamb, Kidderminster—Jacquard machinery.
1792. T. Wallworth, Manchester—Purifying grain, dressing flour, and in machinery for same.
1794. W. Johnson, 47, Lincoln's inn fields—Windlasses. (A communication.)

Dated 17th August, 1854.

1796. J. T. Wright and E. P. Wright, Birmingham—Ropes, &c.
1798. C. Blake, Saint Leonards, Sussex—Doors and window frames.
1800. J. Bernard, Club chambers, Regent street—Boots and shoes.

Dated 18th August, 1854.

1802. S. Spalding, Hull—Preventing loss of life at sea.
1804. W. Baker, Birmingham—A new or improved bezils or rings used in glazing the dials of clocks, &c.
1806. J. R. Hill, 39, Princes street, Stamford street, Lambeth—Pulverizing metallic ores, &c.
1808. T. W. Rammell, Trafalgar square—Stoves and fire-places.
1810. A. F. Newton, 66, Chancery lane—Direct acting marine engines. (A communication.)
1812.—P. A. le Comte de Fontaine Moreau, 4, South street, Finsbury, and 39, Rue de l'Echiquier, Paris—Preserving corn and other dry seed. (A communication.)
1814. W. Ker and M. Ker, Tottenham Court road—Frames of expanding tables.
1816. S. Kershaw and James Taylor, Heywood—Carding machines.
1818. F. Mathieu, Bartlett's buildings, Holborn—Filters.
1820. W. Johnson, 47, Lincoln's inn fields, and Glasgow—Hat bodies. (A communication.)

Dated 19th August, 1854.

1822. C. O'Neill, Liverpool—Berths in emigrant ships or other vessels.
1824. J. Barrows, Handsworth, Staffordshire—Cutting loaves of bread, &c.
1826. J. Hodgson, 16, Sweeting street, Liverpool—Iron vessels.
1828. G. T. Smartt, Doncaster—Economising use of grease, oil, &c., in axle-boxes.
1830. W. V. Greenwood and J. Saxby, Brighton—Signal lamps.

Dated 21st August, 1854.

1834. T. Miller, Fairfield place, Stepney—Apparatus for raising coals, &c., from the holds of ships, &c.
1836. S. T. Jones, 3, Union Court, Old Broad street—Washing minerals to extract metal therefrom.
1838. R. B. Cooley, High street, Nottingham, and Mercer's row, Northampton—Gloves.

Dated 22nd August, 1854.

1840. A. Jacquelain, Paris—Gas.
1842. W. H. Meriwether, Morley's Hotel, Strand—Fences and hurdles.
1844. J. Buchanan, Leamington Priors—Marine engines.
1846. J. L. Hancock, Milford Haven, Pembrokeshire—Pneumatic safety inkstand.
1848. C. Blunt, Sydenham, and J. W. Watson, Wandsworth, Ph. D.—Artificial fuel.

INVENTIONS WITH COMPLETE SPECIFICATIONS FILED.

1850. T. Schwann, Neuss, Prussia, M.D.—Apparatus worked by spirals.—23rd August, 1854.
1894. P. A. de Saint Simon Sicard, Paris—Apparatus for raising and destroying submerged vessels, rocks, and other bodies, &c.—29th August, 1854.

WEEKLY LIST OF PATENTS SEALED.

Sealed August 29th, 1854.

1164. Joseph Harrison, Fitzroy square—Improvements in pianofortes.
1237. William Edward Newton, 66, Chancery lane—Improvements in breech-loading firearms.
1361. William Edward Newton, 66, Chancery lane—Improvements in apparatus for generating and utilizing steam.
1451. Walter Greenshields, Edinburgh—Improvements in chenille fabrics.
1513. Paul François Aerts, Brussels—Improvements in constructing parts of railway rolling stock, and in the lubrication thereof.

Sealed September 1st, 1854.

524. William Vaughan, Stockport, and John Scattergood, Heaton Norris, Lancashire—Improvements in machinery, apparatus, or implements for weaving.
527. Charles De Bergue, 9, Dowgate hill, London—Improvements in apparatus for bearing and buffing purposes.
562. James Smith, Liverpool—Improvements in baking ovens.
584. Zophirin Boitteux, Epinal (France), and 16, Castle street, Holborn—Improvements in the machinery for sculpturing and carving.
586. J. Patterson, Beverley—Improvements in machines for washing cloth and similar materials.
658. Claude Adrien Bernard Chenot, Paris, 29, Boulevart St. Martin, and 16, Castle street, Holborn—Improvements in the manufacture of steel, iron, and different alloys, cast, welded, and moulded.
660. John Longbottom, 29, Merrion street, Leeds—Improvements in combining atmospheric air with hydrocarbons for the purposes of light and heat.
676. Thomas Simons Watson, 444, West Strand—Improved railway traverser.
678. John Horsfall Robinson, Hebden Bridge, Yorkshire—Improvements in steam boilers.
778. Henry Blatter, Paris, and 4, South street, Finsbury, London—Improved mode of constructing thermometers.
1270. Thomas Richardson, Portland place, Newcastle on Tyne—Improvements in the manufacture of alum.
1448. John Kolbe Milne, Edinburgh—Improved means of holding letters, documents, or other similar articles.
1460. Thomas Haimes, Melbourne, Derby—Improvements in the manufacture of gloves and mits by warp machinery.
1480. John Glasgow, Manchester—Improvements in machinery or apparatus for cutting, compressing, punching, shearing, and shaping metals.
1520. William Eassie, Gloucester—Improvements in trucks used on railways.

Sealed September 5th, 1854.

567. William Young, Queen street, Cheapside—Improvements in lamps.
597. John Buchanan, Leamington Priors, Warwickshire—Improvements in the propellers and apparatus used for propelling vessels.
603. Edward Haeffely, Radcliffe, Lancashire—Improvements in the manufacture of stannates of soda, potash, and ammonia.
635. John Gerard, Guernsey—Machinery for cutting and stamping soap.
665. William Stevens, and William Stevens, junr., Birmingham—New or improved machinery for grinding and polishing lenses.
771. Bernhard Samuelson, Banbury, Oxfordshire—Improvements in machinery for cutting turnips and other vegetable substances.
877. Frederic Barnett, No. 6, Caroline street, Bedford square—Illuminated furniture, &c., for interior and exterior decoration.
1391. Richard Garrett, junior, Leiston Works, near Saxmundham, Suffolk—Improved arrangement of valves for working steam expansively.
1439. Thomas Slater, Somers place, West, St. Pancras, Middlesex, and Joseph Fall, Crawford street, Marylebone—Improvements in the construction of planes, and in cutting apparatus, and in the machinery employed therein.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Sept. 1.	3632	An Elastic Gore, to be inserted in and form part of the front of a Boot	John Holme .... and William Paplow	Manchester, bootmaker. Stafford, shoemaker.
2.	3633	Self-acting Cricket Stumps	Aquilla Clapshaw	3, Upper Fountain place, City road, Manufacturer.

Journal of the Society of Arts.

FRIDAY, SEPTEMBER 29, 1854.

SUBJECTS FOR PREMIUMS.

The Secretary would be glad to receive suggestions for the forthcoming List of Subjects for Premiums. In the event of any member being willing to aid in drawing up the list, the secretary would feel much indebted by his communicating without delay, as it is intended to issue the list this day week.

Educational Exhibition.

The accounts of the receipts and expenditure are not yet completed, but it is certain that there will be a considerable deficit beyond the receipts and the sum already subscribed.

The Special Subscriptions amount at present to only £1,080 19s. 0d., including a subscription of £100 from H.R.H. the President. It is hoped that many Members of the Society, who have not already contributed to the Special Fund for the expenses of the Educational Exhibition, may still be willing to give their aid.

EIGHTEENTH LIST.

Horace Mann . . . . . £1 1s. 0d.

THE NEW YORK FREE ACADEMY.

The Board of Education of the city of New York have kindly furnished the Society with the following particulars of this Institution, which cannot fail to be read with deep interest:—

The New York Free Academy is a legitimate and almost inevitable development of the system of popular instruction so liberally endowed by the State, and so amply provided for by the city whose name it bears. The interests of the body politic, viewed from an enlightened point, in its public as well as in its less extended relations, have ever seemed to demand some scheme of instruction by which the children of the masses may enjoy the privileges and advantages of at least a good English education. The circumstances of many are such that they would be precluded from receiving any instruction whatever of a literary character, were the chances left to the ability or disposition of parents or guardians. The question accordingly becomes one of vast importance to the State, whether some system of popular instruction shall be established and maintained at the public charge, or whether the children of tens of thousands of parents shall be left to the improbabilities of their circumstances. To overlook and to neglect the education of the youth of a state is to give them as a pledge to ignorance, and to assign them to thriftlessness, poverty, vice, and crime. The economy of providing an education for the young, as a simple safeguard against social disasters and public burdens, is so apparent that it needs no illustration.

The founders of the school system of the city of New York acted early in obedience to the teachings of such a policy, and half a century since a society of benevolent men was incorporated by the Legislature of the State, under the title of the Public School Society of New York. Under the control of that Institution nearly one hundred schools were organised at various times, all of which were conducted with great economy and prudence, yet with an enlightened liberality fully up to the means placed at its disposal by the city treasury. About the year 1840 a desire for some alteration in the Common School System was expressed by some of the people of the city, and after an earnest discussion of two years an act was passed by the legislature by which the Board of Education was created, and in compliance with which act the commissioners were elected, and entered upon the duties of their office. This board is composed of gentlemen elected by the popular vote, and has full power to legislate upon all the educational interests of the city. Only a few years had transpired before it became apparent to many that a very important advance in the standard of popular education was not only expedient but demanded by the wants of the city, at that time numbering half a million of inhabitants. This advance, it was believed, would be obtained by the endowment of an institution which should afford to the people the opportunities and advantages of a thorough collegiate course in all the branches which give dignity and power to a High School or College of the first rank. On the 27th of July, 1846, Mr. Townsend Harris, one of the commissioners, offered a resolution in the Board of Education, upon the adoption of which a committee was appointed to report upon the expediency of establishing such an Institution. After a deliberation of six months, on the 20th of January, 1847, a report from the committee was submitted, urging the importance of the proposed High School upon the attention of the Board. On February 10th following, the report was considered, and a committee appointed to memorialise the legislature to procure the passage of a law authorising the Board of Education to found and organize the New York Free Academy. On the 7th of May in the same year, the legislature of the State passed the act under the provisions of which the Institution was established, with a clause providing that the question of adoption should be submitted to the people at the next ensuing election of school officers to be held in June. The question was so submitted, and the result of the vote was a majority of 15,995 in its favour,—the votes being 19,404 in the affirmative, and 3,409 in the negative. On the rendition of this enormous popular verdict, the Board proceeded to procure the plans of distinguished architects, and before the close of November of that year, the ground was broken for the new Institution. The lot upon which the building stands extends 200 feet on Twenty-third-street, and 122½ feet on Lexington-avenue, and was purchased for 25,000 dollars. The edifice is 125 feet by 80 feet deep, and consists, exclusive of the basement, and great hall on the upper floor, of three spacious stories, which are intersected at right angles by two wide passages through the middle of the building. It was constructed with a view to the accommodation of one thousand students. The entire cost of the building was a little less than 50,000 dollars. On the 15th of January, 1849, the Institution was opened for the examination of candidates for admission; and on January 27th the formal dedication ceremonies and inauguration of the Principal and Faculty took place, and the active duties of instruction were commenced on the 5th of the following month.

As the Academy depended upon a class of students assembled for the first time from many different schools in the city, whose qualifications and scholarship were still to be fully tested, and the number of candidates having been a matter of doubt, a thorough organisation was not at first attempted. Considerations of the highest importance in regard to the range of studies, the proper text-books, the rank of the students, the wants of the institution, and the necessity of some experience in the particular sphere which the Free Academy was designed to fill, furnished additional reasons for this delay in the permanent organisation of the Institution. The Academy, however, after the fullest and most mature deliberation, was organised as already stated, and the following-named gentlemen entered upon their several duties:—

Horace Webster, LL.D., Principal.

Edward C. Ross, Professor of Mathematics and Natural Philosophy.

Gerardus B. Docharty, Assistant Professor of Mathematics and Natural Philosophy.

Theodore Irving, Professor of History and Belles Lettres.

John J. Owen, D.D., Professor of Ancient Languages and Literature.

Oliver W. Gibbs, Professor of Chemistry and Physics.

Jean Roemer, Professor of French Language and Literature.

Augustin J. Morales, Professor of Spanish Language and Literature.

Theodore Glaubensklee, Professor of German Language and Literature.

Paul P. Duggan, Professor of Drawing.

Thus originated and commenced the Free Academy; the first institution in the State of New York which was specially designed to afford to the poorest as well as to the wealthiest citizen the benefits of a thorough collegiate course of studies, without any cost whatever to the student. The liberality and noble policy of its founders and of the Legislature of the State, have not, by its history so far, been made a matter of question, but the Institution continually extends its influence and wins new friends by its career.

The qualifications for admission to the Academy are as follows:—No student can be admitted unless he reside in the city of New York, be thirteen years of age, shall have attended the Common Schools twelve months, and shall pass a good examination in spelling, reading, writing, English grammar, geography, arithmetic, elementary book-keeping, history of the United States, and algebra, as far as simple equations inclusive. There are two examinations for the admission of students during the year, one in the month of February, and the second in July. There are also two examinations for the advancement of students, which occupy about two weeks, just preceding the examination of admission. These are both oral and written, the written papers being answers to questions prepared by the professors, and which are placed in the hands of the students only on the morning of the day upon which the examinations in the respective subjects are to take place. A few weeks previous to the time for the examination of candidates for admission, a circular is addressed by the President of the Faculty to the principals of the various public schools, notifying them thereof, and enclosing blank certificates in the following form, to be filled by the teachers:—

I certify that now residing at No. street, in the city of New York, aged years, on the day of 18 , has been a pupil in school, No. for from A.D. 18 to 18 .

Of this time the Pupil was in the Primary Department, and in the Male Department.

Dated the day of

Principal.

Appended to the above is a certificate to be signed by the parent or guardian, as follows:—

I hereby certify that the age of , as given in the foregoing certificate, is correct.

Parent or Guardian.

The candidate thus endorsed presents himself before the principal of the academy, who directs the registrar to make an accurate entry of the various facts which are recorded in the respective journals, on the completion of which the student is furnished with a printed card containing the following directions:—"1. Throughout the examination you will be known only by the number on the opposite side of this card. 2. Do not write your name upon any of your exercises. Every exercise so marked will be rejected. 3. Write your number conspicuously at the top of every exercise. 4. Avoid all talking or communicating with other candidates, either at your seats, or while passing in and out. 5. Bring no book of any kind to the examination. 6. Be careful not to loose this card, which will be called for at the close of the examination." The reverse is blank, affording space for the entry of the subjects in which the student is examined. The number by which his name is registered is written upon this card, the name, school from which he came, and parentage being altogether unknown to the professors. This serves to prevent names or personal influence from affecting the decision of the examiners in regard to the merits of the candidates, and the record is made of a number in a scale of ten which indicates the merit of the pupil. Ten is the maximum, and should the requisite number not be reached, on a comparison of results in the various departments, the candidate is marked deficient, and his application is rejected.

The student having passed his examination enters upon his course of studies, which is to be in every respect absolutely free. There is no charge of any kind. All the supplies are furnished by the Institution—lexicons and text-books, even to the slate pencil, paper for literary exercise, crayons, penholders, drawing materials and mathematical instruments. The academy furnishes the means, and requires only that the student shall furnish the industry, the talent, and the ambition to use them to the best possible advantage.

There is a well-selected chemical and philosophical apparatus from the best European and American establishments, and additions are constantly made to these departments. The library now numbers about four thousand volumes, including many of the most valuable literary and scientific works in English, French, German, Spanish, Latin, and Greek. Additions are made to the Library from the annual appropriations out of the Literature Fund of the State, amounting at the present time to about 1000 dols. per annum.

The Drawing School, which furnishes instruction in the fine arts, and in every department of mechanical and practical drawing and descriptive geometry, is furnished with a rich supply of the finest casts of the Ecole des Beaux Arts, and also casts of many of the Elgin marbles, secured especially for the Academy. The department of natural history, which is but in its infancy of effort, is supplied with a fine cabinet of minerals, shells, skeletons, &c., to which contributions and additions are made from time to time, and which will eventually become a valuable repository of specimens in this department.

Such is a brief summary of the history, present condition and appointments of the Free Academy. Its doors are open to all. The son of the poorest man or woman, if he pass the required test at the examination, may pass as freely through the whole course, and receive the honours, though he be the successful rival of the son of a millionaire, a senator, or a professor. The invitation is to all, and the motto of the state is held up to the mind of the student as his guiding star—"EXCELSIOR."

In order to advance the interests of the Institution, and to stimulate the students to greater effort in their career, several citizens have donated funds for the presentation of medals at the annual examinations. In 1849, Duncan C. Pell placed in the hands of trustees, 500 dols. to be invested, and the income applied annually, for ever, to procure a gold medal, to be awarded to the student who shall have made the greatest proficiency in his general studies. In 1850, Edwin Burr created a similar trust for a gold medal to be awarded to the best mathematician. In 1850, Charles T. Cromwell created a similiar trust for a gold medal to be awarded to the best scholar in History and Belles Lettres. In 1853, Augustus H. Ward created a similiar trust for the presentation of twenty bronze medals, to be awarded to the students who shall have made the most proficiency in the following named subjects:—Chemistry, Natural History, Natural Philosophy, Moral Philosophy, Law, English, Latin, Greek, French, Spanish, German, Oratory, Composition, Logic, Geography, History, Drawing, Algebra and Geometry, Engineering, and Hygiene.

The Board of Education is authorised to confer degrees upon the graduates of the Free Academy, and, in order

to preserve the distinction between the full classical and the modern course, the degree of Bachelor of Arts is conferred upon the graduates in the department of ancient languages, and that of Bachelor of Sciences upon those who have completed the course of modern languages and general science and literature.

The union of the infant school and the college is completed by the Free Academy. Comprehending these, under one grand system of popular education, the little child may step from the nursery to the schoolroom, and, advancing step by step, he may make those attainments in literary and scientific studies which will prepare him for the university, or for entering upon a professional career. The Academy is the completion of the system of instruction, the measure of a munificent provision for pupils, of whatever class, who desire to enjoy the benefits of even a partial course of classical and scientific studies. The value of the Free Academy is not to be judged by the number of those who spend two or three years within its walls, or even by the number of those who complete the course and graduate. While this is a prominent consideration in any question concerning its operations, its results, and its advantages, there is one which affects a far greater number than can be assembled within its class-rooms. The influence of the Institution in elevating the standard of attainment in a city which is rapidly reaching a population of a million of inhabitants, cannot be measured. The examination through which the Common School pupils must pass to entitle them to a place in the Academy establishes not only a higher standard than previously existed, but it demands a more perfect acquaintance with, and proficiency in, the studies themselves. To secure admission to the Academy is consequently an aim in the minds of all who can afford to devote the time to a superior course of scientific and literary culture. It awakens the ambition of the pupils in the schools. It stimulates them to greater exertions. It incites to moral, diligent, and critical acquisition, and nerves to a bolder struggle. This ambition exercises a permanent influence on the character of thousands, to a greater or less extent, and hence, even in those cases where only a partial course is enjoyed, the results are great and lasting. But perhaps the most prominent question involved in the establishment of a free college, where the children of the labouring classes may obtain an education, is that which is suggested by the inquiry, What is the necessity for giving a liberal education to the mechanic, the artisan, or the labourer? The further this inquiry is pressed and probed the more clearly the necessity is made to appear. The whole present history of civilised man, as compared with that of the past proves this, if it afford evidence of any truth whatever,—that society has advanced in the proportion in which knowledge has become popularised. Nearly all the great changes which have been made, and the improvements in the practical affairs of men, have been introduced by the self-made man, or the children of the humble and the obscure. The improvements in mechanism and the arts have almost all of them originated with partially-educated inquirers and thinkers, who have never had the benefit of the school, the academy, or the college. Yet this small share of education which they have enjoyed has served to lead and develop such minds as those of Franklin, Arkwright, Watt, Whitney, Burritt, and others, who have left, or will leave, immortal names in history. If, then, a fragmentary and imperfect education in a common school serves so important a purpose, what may not be expected when a high and liberal education offers its incitements and blessings to hundreds of thousands, who catch the inspiration, and make advances in the path of a truer literary and scientific inquiry. The distribution of knowledge among the people is of the greatest consequence to the interests of mankind. To refuse the blessings of intellectual growth and cultivation to a class of workers because they swing the sledge, tread the lathe, tan a hide, or bore out a cylinder, is simply to deny that knowledge has a universality of power which it will bestow upon all who seek her treasures. The more intelligent and cultivated is the mind of the worker, the better will he be qualified to dignify and lend a lustre even to the business walks of life. The possession of a literary and scientific education need not disqualify a man for the active labours of the plough, the loom, or the anvil. It should, and it is believed it will, make him a more intelligent and competent worker. The great want of the age in this respect is a more general spread of knowledge among working men, artisans, and labourers of every kind. While the industrial pursuits were limited to comparatively rude and imperfect products of skill, it was tolerable that the working man should be a mere machine, for at that time the press had not begun to speak with ten million tongues in every dialect of the globe. But, as soon as thought began to find a free channel through which it could reach every hamlet and every individual of the state—as soon as science began to multiply and accumulate its facts, and the number of inquirers was increased, this contact of the mind with the practical things of life began to develop its results in the rapid multiplication of observers, thinkers, and experimenters, who have each in turn contributed to the advancement of society. Most of the vast material changes and advances in society during the last three hundred years have had their origin in the partially-educated minds of working men. Elevate the standard, shed abroad the beams, open the fountains of knowledge, so that they may become universally diffused and enjoyed, and tens of thousands of minds lying dormant will be awakened to a thoughtful activity; and in the peculiar mental conformation of some minds may be found the thoughts and discoveries which will advance man in a ratio exceeding that of any other age. The labourer should not be a mere machine. The innumerable demands made upon the resources of the human mind by the increasing wants of a race becoming more and more numerous and compact, call for fertility of invention, boldness of discovery, and perfection of artistic excellence. An uneducated and unenlightened mind cannot be fertile in bold and noble thoughts and conceptions. The mind of the masses can never become an element in enlightened progress until it is put in motion. This activity of mind can only be the result of widely distributed knowledge. Then, when all the intelligence and thought-being of the worker is aroused and led to inquiry, a new existence seems to hold out its countless pleasures and rewards. The higher the standard of education the more advanced will be the class of labourers who will be able to unfold the new truths and develop new sources of power, wealth, and progress. The simply educated man who has nothing of the practical is as far removed from the character of a truly educated man, as is the labourer who is destitute of literary and scientific culture. But bring them together. Make the worker an educated man. Give a high character to his thoughts. Teach him the scientific principles upon which all arts depend, and the engine builder and the gardener, the bricklayer and the clerk, will be made more truly to embody the character of a man than by any other means. The vast power to be obtained by making knowledge universal, and the advantages to be derived by affording the opportunities of a liberal education to even the humblest labourer are incalculable. Experiment, wherever it has been made, has justified the wisdom of the measures used, and rewarded the outlay. But underlying these questions is one involving a broader view of the relationships in society existing under popular institutions. The idea of the equality of natural right, leads to a consequent reciprocity between classes of society very different in social position. The master or employer in the United States does not regard his journeymen and apprentices as they are regarded in other lands, and under other political institutions. The consciousness of being a master is lost in a great measure in view of the rights and interests of the labourer. The master loses a large share of his authority, but he more than replaces it by the

cordial and intelligent respect and service of his employées. Thus this intelligent and willing reciprocity of intercouse between classes, while it tends to elevate the lower does not degrade the higher. A perfect development of the system, could it be reached, would exhibit a highly advanced condition of human society. Under these popular and voluntary systems, therefore, any scheme for bringing together under the same classic shades, youth representing every rank in the social scale, to learn at the same school, to drink at the same fountain, and to struggle at the same contests of intellectual progress, must inevitably tend to advance society faster than by any possible system of class-restrictions where conventional distinctions are preserved in the halls of learning. In an institution like the New York Free Academy, this bold purpose of the popular institutions of the United States is realised and wrought out on a grand scale. Its appointments are adapted for several hundred students; its course of studies is wide in its range and practical in its character, and its inspiration is eminently popular and progressive.

The tendency to make education of a high order general and desired among all the people is greater every year. Where our popular institutions are dependent for their strength and perpetuity upon the highly cultivated moral sense and enlightenment of the people, the conservative power of education and virtue must be made to reach every individual if possible. Their influences cannot be better developed or exerted than by making all classes of society meet together in one brotherhood: and, throwing aside artificial class-distinctions of wealth and position, which are accidents liable to be speedly lost, they engage in the same race, knowing only one name, one purpose, and one desire, for the time being. Who wins the honours of the race, be he the son of a blacksmith, or of a senator, whether he sit under the glare of dazzling lights or over the embers of a smouldering fire at his studies, is the noblest son of our Free College.

June 13, 1854.

ON THE RAW MATERIAL FOR THE MANUFACTURE OF PAPER.

It is unquestionably true that there is a great and increasing scarcity of the raw material used in paper-making. The cause of this scarcity, in spite of an increased demand, would appear to depend on the circumstance that the raw material of paper-making is in reality the product of the wear and tear of a substance of very advanced manufacture, and depending for its quantity on the collateral causes which produce a greater or less activity in the latter. Hence the stoppage or partial suspension of linen and cotton manufactures is sufficient to account for occasional and especially local scarcity. Thus the paper-mills have been influenced by the lock-outs of Wigan and Preston, and the half-time working of Belfast and the surrounding districts.

It would appear, also, that, apart from occasional depressions of the manufactures, or the wear and tear of which the raw material of paper chiefly depends, the demands of the paper-makers have been greater than can be supplied by the *less* increased rate of consumption of the manufactured products. While this has been the case, other consumers of the raw material have come into existence, railways and steam-boats now exhausting a very large quantity of cotton and other waste for wiping machinery. But the most important of all new competitors have been undoubtedly the Americans, who have purchased not only largely in our own markets, but also in those foreign parts which are open for the sale of rags. It may be mentioned also, that the rag trade is in the hands of only a few capitalists, who buy from small collectors and import from abroad, and that this limitation of the trade enables them readily for a time to influence the market, both as to supply and price, by withholding their stocks, but these influences can only be temporary, and cannot be persevered in for long periods.

The disadvantage of the *raw material* of paper-making being dependent upon manufactures having no immediate relation to its supply and demand, and the fact, also, that the growing thirst for literature is at a greater rate than the increase in the manufacture of cotton and flax, seem to furnish adequate reasons why the supply of rags does not meet the increased demand.

Many attempts have been made to furnish new raw materials for paper, but hitherto with only partial success. The failure generally results from one or more of three causes. (*a*) Some fibres require so much cost to bring them to the state in which they are offered to paper-makers, in the form of rags or cotton waste, that in point of economy they cannot enter into competition with the latter. (*b*) Certain fibres loose so much weight in bringing them to this state that they cease to be economical. (*c*) Certain fibres, which are well adapted on account of their texture for the paper trade, present so many difficulties in bleaching them as to render them unfit for white paper. The Surat bass in which cotton has of late years been imported into this country, offers an example of this difficulty.

The price which is mentioned in the Treasury letter, of 2d. to 2½d. per lb. for a partially-prepared pulp is generally considered by most makers to be too high, and they think that materials to be of benefit should be looked for at the price of 1d. to 1½d. per lb. The latter price refers to *roughly*-prepared pulp, but should the pulp be offered in a bleached state, or in as far an advanced state with regard to colour and texture as cotton or linen rag, then 2½d. to 4d. per lb. might be obtained. The quantity of any promising material sent home for experiment should not be less than half a ton in weight.

In considering this subject, it appears that very little is known of the statistics of the consumption of various materials used in the manufacture of paper, and that an inquiry on this subject would be useful.

LYON PLAYFAIR.

To Sir J. E. Tennent, Board of Trade.

THE VENTILATION OF ST. GEORGE'S HALL, LIVERPOOL.

(Abridged from the *Morning Chronicle*.)

Any account of the new St. George's Hall would be incomplete which did not attempt to give some description of Dr. Reid's vast system of ventilation and warming the edifice. Far down in the depths, below the tesselated floor of the hall, there are furnaces, and boilers, and steam-engines, and fans, and miles of pipes, and arched galleries, and vast iron recesses, where the gnomes and the zephyrs and other breezy deities work with unexhausted energies to supply the breath of life for the myriad-peopled edifice; while far above the heads of the enraptured audience furnaces and other volcanic agencies are brought to bear for the purpose of scattering to the winds the air which, having passed through the minute air vessels of the lungs, has become vitiated by contact with humanity.

Let us first descend to the realms of Pluto, the great laboratory of hot and cold St. George's air. Descending from the level of the hall, a lower story is reached, where are ranged a series of prison cells, the ventilation and warming of which are placed beyond the control of the pining and mischievous occupant, the fresh air being admitted through a valve at the bottom of the door, and the discharge of the vitiated air being regulated by valves in the ceiling, the opening and shutting of which is effected by a quadrant-shaped instrument placed on the exterior of the cell. Descend another stage far down into the foundation of the building, and at the north and south end of the space beneath the central hall, huge boilers and furnaces are encountered, their fires gleaming and

roaring through the sombre darkness with vast scenic and pandemonium-like effect. Of these furnaces and boilers, one at each end of the building is appropriated to the supply of hot water for a series of pipes connected with the manufacture of warm air for the building. Three sets of pipes are attached to two of the boilers, each set being about fifty feet in length, and containing twenty-four distinct pipes, making together more than one mile of 4-inch pipes. These pipes conduct hot water to the neighbourhood of four colossal fans, worked by a central steam-engine of ten-horse power. The cold air is drawn into these subterranean regions from large concealed openings on the basement floor at the eastern side of the building, whence it passes through a series of galleries and chambers, until caught by the fans—10 feet in diameter, which revolve like the huge paddles of some ocean steamer, at from 50 to 75 revolutions per minute. It is then tossed in a terrific whirlwind, amid the labyrinth of hot-water pipes already described, and its temperature being proportionally increased by contact with their heated metallic surfaces, the air, when sufficiently warmed, is diffused through the great hall and courts by a series of valves and open work in the floor and inserted in the walls. When not required to be heated, the air is served up *au naturel* by the agency of other fans having no connection with heated pipes or surfaces. The temperature of the heating surface of these hot-water pipes may be brought up to 100 deg., or 105 deg., but it rarely exceeds 90 deg.

Ascending to the roof not a single chimney meets the eye, and the visitor naturally inquires how and where is the smoke consumed from the 120 fire-places and flues which are scattered throughout the building and its various courts and offices. In the first place, then, Dr. Reid, believing very properly that "prevention is better than cure," makes no smoke. The fire-places are large open grates, which are adapted for burning coal which has been previously brought into a soft state by burning in furnaces similar to those used for making coke; instead, however, of allowing the coal to remain so long in the ovens as to convert it into the ordinary coke, it stays only a sufficient time to admit of its giving off all its carbonic gases, but not for destroying its other gaseous properties. When ignited, the coal, thus partially burned, produces that cheerful smokeless fire which is ordinarily obtained from coal after the discharge of its carbon in the ordinary grates. Strictly speaking there is, therefore, no smoke, except such small quantities as may remain in consequence of imperfect or incomplete combustion in the preparatory stages. This fuel is the same as that which was constantly burned in the House of Commons when the doctor held office at Westminster. It is obtained from contractors in the neighbourhood of Liverpool without difficulty, and at moderate prices.

The discharge of the vitiated air from the furnaces, the water steam from the boilers, the various flues connected with the offices and the law courts, takes place through a series of large horizontal flues, terminating finally in four vertical shafts concealed within the angles of the great hall. To defend these shafts from the action of varying gales of wind, and the endless eddies that whirl around the angles of the roof, a double provision has been made, consisting of louvres in the interior, and externally of large curved deflectors, which turn aside the strongest currents that play upon them. These shafts, concealed by columns which improve the appearance of the great hall, are about 14 feet square, having in the centre a dividing wall with apertures, which may be closed or opened as required.

The smoke from the furnaces and the flues traverses one of these divisions, and the vitiated air from the courts and offices the other. About midway up these shafts are furnaces for the purpose of creating a draught to carry off these noxious products when the state of the external atmosphere is unfavourable to draught. The horizontal flues connected with these shafts admit of several persons walking with ease from one end to the other.

The means adopted for carrying off the vitiated air from the great hall are extensive, but at the same time simple and efficient. The space between the outer side of the arched roof of the great hall and the outer roof of the building is one vast air-chamber. At each end of the building is placed ornamental and open trellised work, through which the heated air rushes with great force into the upper chamber, and is conveyed away through a series of glass louvre plates in the sides of the elevated roof. In the panels into which the ceiling is divided there are twenty valves, corresponding to a similar number of ornamental openings in the under side of the ceiling, giving a discharging surface of 400 feet. These valves may be raised or lowered, as the circumstance of the case may require, by raising with pullies the large wooden flap which covers each of the apertures. There are also a number of side apertures, through which the vitiated air can make its egress, in order to reach the vast air-chamber at the top of the building.

The average temperature at which the hall has been kept throughout the whole of the concerts has been about 67 degrees, varying not more than one degree each way. The plan adopted has proceeded upon the principle of providing the hall, with its approaches and courts and offices, with one vast and complete pneumatic apparatus, capable—so far as the decorations of the structure will admit—of diffusing an equable temperature over every part of its structure. To accomplish this was a task of no small difficulty; and, whatever may have been the reputed failures of Dr. Reid in the House of Commons, under a divided authority and responsibility, it is but justice to say that, in so far as opportunites have at present been afforded, the mode of warming and ventilating St. George's Hall, as suggested and carried out by Dr. Reid, is successful, and has achieved the object for which it was designed.

THE ACADEMY OF FINE ARTS AT CADIZ.

The secretary is indebted for the following particulars to Don Manuel de Ysasi, who, it will be remembered, was the Commissioner from Spain, at the Great Exhibition of 1851, and who takes a peculiar interest in tracing the progress of the different Academies or Schools of Design in all parts of the world. That at Cadiz is *entirely gratuitous*. Some of the results from this Academy were shown in the Educational Exhibition.

The Academy of fine arts of the province of Cadiz is composed of one President, two Counsellors, and twenty Academicians; six of these for painting, two for writing, and four for architecture,—eight of the Academicians are not professors. The school is under the direction of the Academy. The studies pursued in it, the number of professors and assistants, with their salaries, and the number of pupils in each class are given in the accompanying table:—

ELEMENTAL STUDIES.

	Professors	Assistants	Salary	Scholars.
Arithmetic and Geometry	1	"	£60	150
	"	1	30	
On Figure Drawing	3	"	60	200
	"	3	30	
Lineal and Ornamental Drawing	1	"		58
Drawing applicable to Arts and Manufactures	1	"	60 60	24
Modelling and Casting	1	"		10
Landscape Drawing, by the Professor of Landscape Painting	"	"	"	25
Artistic Anatomy	1	"	20	25
Perspective, by the Professor of Landscape Painting	"	"	"	30
Drawing and Painting from the Old Masters, and Copying from Drawings	1	"	80	32
Drawing and Painting from Nature	1	"	90	8
Landscape Painting (this study is being estab'ished)	1	"	80	
Sculpture	1	"	80	4
	12	4		566

There is also a class for ladies, with thirty-six pupils, in which is taught drawing, also drawing from old masters, painting, copying drawings; also drapery from lay figures, flowers, ornamental drawings, &c. This class is under the direction of a professor and one assistant. Paper, pencils, and all utensils for drawing are given gratis to the pupils of all the classes in the establishment. The expenses of the academy and school, both as regards salaries, materials, &c., &c., amount annually to about £1543, of which sum three-fourths is paid by the municipality, and the remaining one-fourth by the province. The Academy has a fine gallery of 25 ancient statues, both colossal and of natural dimensions, and other galleries with heads, &c. For the studies of drapery there are lay figures; and for drawing from nature there are two men as models. The library of the Academy is considered rich in artistic works, both books and engravings; of the latter there are upwards of 5000. In the building of the Academy there is established a museum of paintings, for which there has been constructed recently most spacious galleries; also three others for pictures of great merit and other paintings of standing.

FIRE PROOF BUILDINGS.

By Lady Bentham.

Alas, that so-called *fire-proof* buildings should not withstand fire!—but so it is, and as the protection of property from conflagration may be considered as of national importance, it is hoped that the following attempt to draw scientific attention to the subject will be pardoned.

The failure of such structures appears to be caused by the decomposition of the *calcareous* cements used in their erection, since by intense heat calcareous matters are converted into lime, and lose their adhesive properties. Bricks and stones, being slow conductors of heat, often protect the mortar used for their combination; hence walls frequently stand, though the interior of a building has been consumed by fire. Science may possibly discover some cement capable of resisting a high degree of heat, but in the interim the endeavour might be so to construct an edifice as that all its parts might be really fire-proof.

The walls and partitions might be of metal, without much inconvenience or expense, though they would require to be coated with felt, or some other bad conductor of heat, as is practised by many recent constructors of iron houses; but metal is objectionable for floors, both on account of its weight, and of its unhealthiness when walked upon. Some other material for floors is therefore to be sought, or some new mode of combining iron with other matters, or some means of connecting bricks or stones independently of cement.

Could horizontal divisions be formed of a kind of iron net-work on which to lay tiles, they being incombustible, or even a stratum of slate, or of wood?

Could our improving potteries furnish tiles of sufficient length to reach unsupported massive iron girders?

Could tiles, bricks, or stones be connected together in the form of a flat arch by some mechanical formation of their junctures? In the way of indication referring to tongueing and grooving and to dovetailing in carpentry, to coqueing in shipbuilding, to Mr. Samuel Birce's dome of stones so shaped as to support each other without cement, to Sir Isambert Brunel's arch. And supposing pottery to be determined on, could it, after burning, be brought by machinery to proper form at the surfaces of juncture?

But, however incombustible fire-proof buildings may themselves be made, their contents would always be liable to destruction by accidental fire, and ready means of extinguishing it must therefore always be desirable. Further experience shows that no other apparatus yet contrived has in use been so easy of application, or so successful, as that first exemplified in Portsmouth dockyard, and described in the Journal of the Society of Arts, 23 June, 1854.

Further experience has been obtained by the effects of fires in Pembroke and Chatham dockyards respectively. In Pembroke-yard a fire was discovered at midnight (23rd Jan., 1853), in the boatswain's cabin. The police kept the flames in check by throwing buckets of water over them, till a hose could be screwed on to the nearest fire-plug, the affair of ten minutes after the first discovery of the fire, water was thrown from the hose upon the burning mass, soon extinguished the fire, the damage done by it not exceeding 30*l*. How different the late outbreaks of fire in Chatham-yard! In that establishment the fire-extinguishing works had been neglected, and the use of them unknown; on the discovery of fire in the saw-mills the alarm bell had to be rung, and additional help to be obtained from the vessels in the Medway; hand-engines only were employed—the fire raged for hours, and setting down a thousand pounds for every single pound's worth destroyed at Pembroke, the loss at Chatham would scarcely be covered thereby, not to speak of the delays, the inconvenience, the expense, and the inferiority of the workmanship consequent to the destruction of so much machinery, I have again ventured to request the attention of the Admiralty to fire-extinguishing works, and to the need of keeping them in constant use, and their Secretary has informed me that my letter has been laid before their lordships.

As to Sir Samuel Bentham's plan to extinguish fires in the metropolis, there may exist some petty difficulties in arranging the details of execution, especially in densely-crowded quarters, inhabited by the poorer classes, and where it might be ruinous to the water companies to furnish a continuous supply of water. Highly desirable as such a supply may be, it could hardly be accomplished by giving access to the general mains; but in Bermondsey, if I mistake not, an example has been afforded of means by which all the desired results of a continuous supply might be obtained, together with readiness of water for the extinguishment of fire. In several streets in that quarter, elevated reservoirs have been constructed, from which are pipes to the several dwellings to be supplied; and thus the respective inhabitants possess all the advantages of a continuous supply of water, though the company that supplies it be not exposed to the inconvenience of keeping their mains constantly full, or to suspicion, at least, that a wasteful quantity of the element has been expended.

Reservoirs on the roofs of many houses seem desirable, and pipes issuing from them for the general supply of the inmates with water. What is not in constant use is apt to be neglected, as has been before noticed, and the advantageous situation of such pipes in the Prince of Wales's Tower, at Windsor, was manifest when the tower was on fire. They would be no disparagement of the most splendid staircase, since the head rail might be a water-pipe, and the taps ornamental appendages. Such reservoirs seem particularly eligible in parts of the City of London where much valuable merchandise is collected in a small space. At the late fire in Bread-street a *million's* worth of goods was said to be in jeopardy. A reservoir need not necessarily be on every house, for one such receptacle might furnish water enough to allay fire till the general water mains could be opened.

The commodiousness of interior staircases seems to have caused their danger to be disregarded; they serve as tunnels for the conveyance of air to any part of a building that may catch fire, and it is the suffocating smoke of a staircase that in nearly all cases prevents the escape of persons from a building on fire. In 1810, when the Admiralty had determined to renovate Sheerness instead of transferring the dockyard to the Isle of Grain, Sir Samuel Bentham had to devise a new town, as well as a new dockyard;—neither of his plans found favour, but that is not the present question; what seems to be relevant to escape from fire is, that the lodgings of operatives and labourers, and such like, were to be without any interior staircase, and were to be entered by exterior galleries, [illegible] still be seen in some ancient inns. This mode of [illegible]

each dwelling has in some instances been lately adopted, and seems desirable on sanatory grounds no less than on that of escape from fire. It is capable of extension to warehouses generally, and in new houses their staircases might be projected from either the front or the back of the house. One can fancy that at every story a door might be provided, and that the last person up at night should shut all those doors by one single piece of mechanism; nay, further, that some little box seat in the entrance-hall or passage should contain a hose, and means of letting water into a pipe from a reservoir; such a box might be accessible from the street; it might be locked, and the policeman on duty at the spot might be furnished with a key, the locks on the same beat being all similar. Were some such arrangement ever made, the policeman, on discovery of fire, instead of dispatching messengers to engine-stations, would instantly apply the hose where most needed, thus probably extinguishing the fire at once, at least keeping it in check till further assistance could arrive, and so far cool the staircase as to be no longer impassable by the inmates of the dwelling.

In conclusion, it may be observed that though fire-proof buildings be not at present literally so, yet they greatly diminish the danger of conflagration; it is only by very intense heat that calcareous cements are burnt to lime. The present system of fire-proof structure appears to have been devised by Sir Samuel Benthan in the year 1794. See "Naval Papers," No. 8, page 64, a copy of which is in the library of the Society of Arts..

M. S. BENTHAM.

MANUFACTURE OF PLANTAIN FIBRE.

The Honourable the Court of Policy of the colony of British Guiana, combined with the financial representatives of the inhabitants of the said colony, at its annual assembly, held at the Guiana Public Buildings, Georgetown, Demerary, on the 17th March last, agreed to the following resolution, moved by the Hon. Mr. Minscher:—

"That this court pledges the colony to provide the sum of 5,000 dollars as a premium for the first machine with which shall have been made in the colony 100 tons of clear plantain fibre during the course of a year, the decision about the quality of the plantain fibre, &c., to be left to the Agricultural Society of British Guiana."

Home Correspondence.

THE BOOKS EXHIBITED AT ST. MARTIN'S HALL.

FOURTH ARTICLE.

BOOKS ON ELEMENTARY MATHEMATICS.

Sir,—With reference to the improvement of the useful arts, the great object of the Society of Arts in its educational movement, there is no branch of knowledge more important than mathematics. The great work of computation is a direct application of mathematics; and a very moderate knowledge of algebra facilitates very much calculations in interest, simple and compound, while questions in annuities, insurance, and statistics depend upon algebraic principles for their solution. Mensuration, surveying, navigation, and the construction of charts and plans, are purely mathematical operations: the carpenter, the glazier, the builder, the surveyor, the mariner, the draughtsman are little better than mere calculating machines if they have no acquaintance with the principles of the rules by which they work—that is, with the fundamental truths of algebra and geometry. But there is yet another most important application of mathematical science. The investigation, demonstration, and expression of the laws of mechanical science depend upon mathematics. It is impossible for any one to acquire anything beyond a mere smattering,—to possess any available knowledge of mechanics (including statics and dynamics, and their application to the principles of machinery), hydrostatics, hydraulics, pneumatics, optics, electricity, magnetism, if he cannot understand a few algebraic formulæ and geometrical principles. Now, we may leave out of consideration for the present the investigation of questions in mechanics, to discover new truths and applications; we may even dispense with the demonstration of the existing truths (not that such a course is advisable), but we have the very important fact remaining that we require mathematics for the mere *expression* of the laws of mechanical science in such a way as to be available for any practical purpose. The above-named divisions of mechanical science are the foundation of the mechanical arts: the construction and action of machinery depend upon them; and the student who desires to make himself acquainted with any of them is stopped at the very threshold if he does not understand the formulæ of algebra and trigonometry. What progress can be made in the study of the composition of forces by one who knows nothing of a sine or a cosine, to whom the simple and beautiful relations of the trigonometrical lines are a sealed book? How can the rules for the lever (including the wheel and axle, and wheel work in general) be made intelligible to him to whom an equation and a ratio are mysteries? In short, turn to what part you will, of those vast fields of science that treat of force and pressure, and of motion over a sensible distance—where space and time are involved—in fact, to every department of the useful arts, except those resting on chemistry—you are confined to the most superficial notions, and are very apt to form wrong notions, if you cannot read and understand the mathematical expression of the principle. Not only are there no exact data on which to proceed in the application of physical principles to practice, without their mathematical expression, but many beautiful truths, which would interest and delight and excite to further study, are shut out from him who cannot read the language of the mathematics.

It may be thought, perhaps, that this is sufficiently obvious, and that it is not necessary to insist upon it. But our Mechanics' Institutes and popular class-books on mechanical science prove the contrary. There are elaborate systematic courses of lectures given on Natural Philosophy to youth who have little or no knowledge of mathematics,—youth whose occupations are connected with the mechanical arts, who desire to become acquainted with the principles on which these arts depend, and who, misled by the Institute which should guide them, fancy they can obtain that knowledge, without any previous qualification, by attending popular lectures on Natural Philosophy. They acquire a loose notion of some general principles and popular phenomena, and finding no substantial gain by their attendance, soon give it up, become disinclined to solid study, and sink into mere rule-of-thumb men. It is the same with those who seek information in popular works; from these they derive little knowledge capable of throwing light on the principles of their art. Chemistry, zoology, botany may be understood without any mathematical knowledge; not so mechanical science;—but they are all usually set in the same category. Hence, then, one great cause of the ignorance of those engaged in the various mechanical arts of the principles on which their operations depend—the want of the necessary mathematical information. How is it, then, that this is not supplied? *The adherence to the use of Euclid as the geometrical class-book in our middle and lower schools is the great cause of the inadequacy of the mathematical information posessed by our youth.*

It almost looks like sacrilege to say anything against Euclid. But it is, nevertheless, true that the wants of the times have outgrown this justly-celebrated work, and that most other civilized countries have now abandoned it. Still Euclid reigns paramount among us; with few exceptions, the geometrical text-books are, for the elementary course, somebody's edition of of Simson's Euclid, and scarcely a year passes without the appearance of some new Euclid, differing from others in little except the names of the editor and publisher. The ambition of teachers is to take their pupils as far as possible through the

first six books of that work. Publishers of educational series, following the fashion, bring out a cheap geometrical work, but the reader in vain looks for any adaptation of the matter to his wants; the Geometry for the People turns out merely a cheap reprint of the best Euclid that is open to the publisher without infringing a copyright. Nay, if the six books are too much, let the learner have three books; and if he has not time for these, let him have one book; what is left, like the Sybil's books, becoming more precious the more there is lost. That seems to be the principle upon which editors and publishers of cheap educational series proceed. An infinitesimal dose of Euclid is better than anything modern genius can devise!

They order these things better in France and in the United States. For many years Euclid has been given up in France as prolix and tedious. The magnificent structure of mathematical science, with its rich and beautiful applications, is now too extensive for the visitor to dwell upon the threshold during the principal portion of his time. A new arrangement of the elementary propositions of geometry, leading the learner as surely, and in about half the time, to the same practical results, is sanctioned by the great names of Legendre and Lacroix, and has been established in the French schools and universities. The standard work for the universities is "Eléments de Géometrie, avec des Notes; par A. M. Legendre; quatorzième edition; Didot, Freres." The following is a cheaper and more condensed treatise, not, however, containing trigonometry—"Manuel d'Etudes pour la Section des Sciences dans les Lycees; Geometrie, par M. de Salve; Dezobry et E. Magdeleine." Nor among the books from the United States of America is there a single Euclid to be seen; the leading geometrical treatise seems to be, "Elements of Geometry and Trigonometry, from the works of A. M. Legendre. Revised and adapted to the course of Mathematical Instruction in the United States. By Charles Davies, LL.D. Barnes, New York." This is a very complete work. In 370 by no means closely-printed pages it gives the substance of the first six books of Euclid, the quadrature of the circle, solid geometry, plane trigonometry, analytical plane trigonometry, spherical geometry and trigonometry, application of algebra to geometry, mensuration of surfaces, mensuration of solids, and, in addition, sixty-two pages of logarithms and logarithmic sines and tangents. The combination of theory and practice in one volume may shock our abstract and refined tastes, but renders the volume really very useful and complete, and valuable to the student after his scholastic career is ended. There is another very excellent work, by the same author—"Elements of Geometry and Trigonometry, with applications in Mensuration," 12mo., pp. 262, with 62 additional pages, as above, designed for such students as are carried beyond the acquisition of facts and mere practical knowledge, but have not time to go through a full course of mathematical studies. "Elements of Geometry, with Practical Applications, designed for beginners; by George R. Perkins, A.M. Appleton and Co., New York"—is another very useful work, similar in character to the last, containing the substance of the first six books of Euclid, with the quadrature of the circle, solid geometry, and spherical geometry, and practical applications interspersed through the work; being introduced as they arise naturally out of the different propositions.

Although adherence to Euclid is the almost invariable practice in this country, the rule is not without some exceptions. The "Geometry in the Library of Useful Knowledge" was among the first notable attempts to introduce a different method; the excellent little work, "The Elements of Geometry Symbolically Arranged: Murray, London," published for the Greenwich Hospital Schools, was another exception, though Euclid was followed pretty closely on some points. And the courses of mathematics used at the Military and Naval Colleges (as the well known courses by Hutton and Gregory) have usually followed a simplified and abbreviated plan. Of these, the "Course of Mathematics used at the East India Company's Military Seminary at Addiscombe, by the Rev. Jonathan Cape," is particularly deserving of attention. Following the method of Legendre, with logical arrangement and rigorous demonstration, the author is enabled, in the short space of 150 pages, to give the substance of Euclid's first six books, the quadrature of the circle, plane and solid angles, the comparison of solids (including the cone, cylinder, and sphere), geometrical analysis, application of algebra to the resolution of geometrical problems, trigonometry, mensuration of heights and distances, and surveying.*

There can be no doubt, then, that by adopting a course such as that of Legendre, Lacroix, Cape, Davies, or Perkins (still further simplified and shortened by treating the second book algebraically), a youth may arrive very much earlier at a given stage of his geometrical studies than by adhering to Euclid; and that one who pursues such an abbreviated course may be able to acquire an extent of mathematical information which will enable him to pursue the study of natural philosophy thoroughly and scientifically; a privilege denied to him whose limited time has been occupied in going through Euclid. We know that in the majority of our middle schools the pupils seldom get beyond the third book—in many not beyond the first; while not a few do stick at the *pons asinorum*, or the propositions immediately following it. Let us consider our objects in teaching mathematics, and the leading classes of learners with whom we have to deal.

We teach the mathematics, then, *first*, to implant in the mind certain information; next, to develop the intelligence by the mental exercise involved in the study. Now it is to be observed that a vast amount of mathematical information, with its applications to mensuration, surveying, and the expression of the laws of mechanical science, may be acquired without going through the demonstrations of the various propositions that are given; not that this course is to be recommended where there is time to master the demonstration; but simply that it may be done; and that, where there is not time for a thorough course, such a course is interesting and useful. To take the instance of trigonometry, there is nothing pleases the young more than the operations of this very elegant art—mensuration of heights and distances, &c. But surely we do not mean to deny the pleasure and advantage of a knowledge of trigonometrical operations to those who can prove the truth of the propositions on which they can rest. Why not, after explaining the necessary terms, start with these propositions as interesting truths to be taken on the teacher's word, and show their interesting and varied applications. It is the same with the various geometric and algebraic principles which are requisite to an understanding of the mathematical principles of natural philosophy. Why must we deny the pleasure and profit attending on the possession of such knowledge, including the opening up the path to physical science, to all who cannot demonstrate every step? * Besides their useful applications, we have positive pleasure in the knowledge of such facts as, that the circumference of a circle is 3·1416 times the

* It is by no means meant that Legendre, Lacroix, or any other of the above authors, should be followed implicitly. The writer is well aware that exceptions may be taken to several points in their demonstrations and methods; but the concurrence of so many in methods substantially the same affords a fair presumption that these methods are not without important advantages.

* Those," says a recent writer, "who have time to pursue their education to the highest point, should certainly (without chaining them down to Euclid), be taken through a course thoroughly demonstrative—not dogmatic. The youth whose education is cut short at fifteen years of age cannot enjoy this educational luxury. But to deprive him of the advantage of knowing interesting and useful propositions because he cannot learn their proofs, seems as reasonable as to deny a lover of nature a fine prospect from a mountain top unless he has time and strength to climb it himself, without aid from horse or mule."

length of the diameter; that the angle in a semicircle is a right angle; that the figure described on the hypothenuse of a right angled-triangle is equal to the sum of the similar figures described on the sides; that the sides about the angles of equi-angular triangles are proportional; that a straight line parallel to one side of a triangle cuts the other sides proportionally: that the sides of a triangle are as the sines of the opposite angles, &c., even although we may not have the slightest idea of the methods by which these propositions are proved. Such knowledge is interesting in itself, without proof—even without practical application—but when it is capable of applications so interesting and so important as those to mechanical science, we submit that those who cannot acquire the proofs should at least be taught the results, and how to apply them.

Again, as to the value of mathematical studies for mental discipline, we think that this has been very greatly over-rated indeed. Mathematics do not furnish examples for exercise in all kinds of reasoning, neither in the highest forms, nor in that which is most required in the ordinary affairs of life; in which it is probabilities, not certainties, of which we have to judge. Not only is mathematical proof of an altogether different character from that of which we have to judge in general, but it is known that many possess considerable mathematical acuteness, who are not remarkable for judgment in other matters. This often arises from a natural quickness in perceiving numerical relations, or relations in the parts of a figure; which relations once clearly perceived, the reasoning is by no means complex; on the contrary, often very simple. It is a defect of geometry, as a means of mental training, that its propositions are too simple, clear, and well defined; the learner is greatly assisted by the certain data, definite course, and even the *ipsissima verba* prescribed. He is, in a manner, in a channel, from which he cannot deviate, like a traveller, along a beaten track, in day light, with finger posts to guide him. Hence the cultivation of mathematical reasoning alone must be very insufficient mental training for the business of the world; and he who has been exercised solely or chiefly in the simple axioms, clear definitions, precise propositions, limited number of data required in each case, and irresistible proofs of mathematical science, will be at fault when he encounters that jumble of ill-defined terms, numerous uncertain premises, half-settled principles, which form the grounds of our ordinary reasoning—that dim, hazy chaos, out of which he must extract light and order. With some minds an exclusive mathematical training may even do harm;—inured to clear, simple, and certain data, and few of them, and summary steps from these to the result, they have a tendency to assume the like qualities in other evidence that comes before them, and hasten precipitately and dogmatically to draw their conclusions; or, accustomed only to the certainty attained in mathematical processes, they have nothing to guide them in those numerous questions where the result is only a greater or less degree of probability, never appreciate moral evidence, and in dealing with it are as if at sea without rudder or compass. Mathematics are valuable for their direct practical applications, as in mensuration—or for their application to develop other branches of science, as mechanics—more than for their use in mental training. See Professor Powell's Lecture, *Journal of the Society of Arts*, No. 88, pp. 630—See also Reid on Education, pp. 212-15, and 279.

With respect to the different classes of learners who have to be instructed in mathematics, we may divide them into three principal sections, each section requiring a distinct class-book adapted to its own peculiar condition and wants. There are first, those who can pursue their education to the highest point; we do not propose to refer to them particularly here; even for that class, Euclid is given up in France and the United States; but certainly, the use of that work as the elementary text-book is not, in the case of this class, attended with the same injurious results as in the other two classes. The next class is composed of those attending the generality of middle schools, leaving school about fifteen or sixteen years of age. For these it appears to be of the greatest importance that they should follow a course such as that pursued in the French and American schools, and in the naval and military colleges in this country, which will provide them with sufficient means for mental exercise in mathematical reasoning, carry them so much further that they will be able to apply their geometrical knowledge to the purposes of practical mathematics and to mechanical science, and render the subject more interesting to them, because less prolix, and connected with some practical applications. A third class is composed of those who attend the common schools, and go to work at twelve or thirteen years of age; making up their way afterwards (such as have the inclination and opportunity) at Mechanics' Institutions. For such it is useless to attempt at all any demonstrative course; but they may have a practical course made exceedingly useful and interesting to them by a judicious selection of results, the application of which can be taught to them. In this way, numbers of curious and important facts in mathematical science might be taught, with their application to purposes of obvious utility, as mensuration and surveying, and to mechanics, and thus a foundation laid which would facilitate the study of the subject at any future time.

With respect to Euclid, its unsuitableness as a class book for any but those who can pursue a very complete course of study, will, we think, be generally admitted. In the first place, there are many propositions not required except for an advanced course; the student who has little time should not be encumbered with these, but be carried on by the shortest and most direct course to trigonometry, which should ever be kept in view as the great end of an *elementary* course of geometry. Next, there are several troublesome propositions, not at all necessary, except to carry out the refined ideas of the ancient geometers, who disdained as much as possible the use of arithmetic, and of mechanical means of operation. It is very interesting, indeed, for those who have leisure, to know, as a matter of curiosity, that the problems of geometry may be performed without transferring the compasses with the limbs set at a given distance from one part of the paper to another: but that eminently practical individual—a boy—laughs at such trifling, as he considers it, and wonders why he may not set the compasses to the required distance, lift them and measure that distance off elsewhere, *as everybody really does in practice.* Thirdly, some of the most embarrassing propositions in the whole work, long and tedious, and with intricate figures, occur at the very commencement, which is not necessary, is against every principle of teaching, and has repelled many from the study altogether, by the unreasonable difficulties accumulated on them on the very threshold. Indeed, it is these difficulties and intricacies at the outset which prevent geometry being acquired at a much earlier age than is usual. In reality, geometrical demonstration is not difficult, but to understand the figures, that is, to read the geometrical language, is perplexing; and were several of the propositions at the beginning of the first book removed, their place being supplied by others more suitable, and were the eye accustomed to consider, separate, and name the various parts of geometrical figures by previous lessons on form, we might begin geometry a year or two earlier than has hitherto been customary, and make more rapid progress. Further, Euclid is unsuitable for our middle and lower schools, from being so *abstract* in its character; practical applications are requisite to give interest to the study; they may or may not be introduced early, but the learner should know that he will come to them sooner or later; this sustains and encourages him. Finally, he will scarcely recur to his abstract Euclid after leaving school; he may, however, to a book which teaches him how to apply his knowledge to practice.

Considering, then, that "the altered state of industrial competition imperatively demands, an infusion, both into elementary and secondary education, of that knowledge of natural powers which is only to be obtained by a systematic study of scientific principles"*—that the scientific principles of the mechanical arts cannot be acquired without some previous mathematical knowledge—that in the multiplicity of subjects to be studied, and short period of school attendance, little time can be allotted to mathematics—it is a point of the utmost importance that the most concise and simple methods and text books be employed in the teaching of mathematics, so as to ensure the possession by the learner at least of those elementary principles which are of the most important and extensive practical application. Further, as the most eminent French geometers have abandoned Euclid, and adopted a more brief and simple method, now universally employed in France; as the United States mathematicians have followed the same course; as several of the military and naval schools in this country find this system most conducive to the progress of their pupils; it appears to be a question demanding the most serious consideration of the conductors of our middle and lower schools, whether they should continue the use of a work which, however admirable in many respects, and however great the services it has unquestionably performed, has been so generally given up elsewhere, as totally inadequate to the wants of our age.

Yours, &c.,

A MEMBER.

LITERARY AND SCIENTIFIC INSTITUTIONS ACT.

Highgate, near London, September 11, 1854.

Dear Sirs,—I have this morning received a printed copy of a letter which appears to have been addressed by you to the directors of the Literary and Mechanics' Institutions which are enrolled in the Lancashire and Cheshire Institutional Association.

In that letter the following passage occurs—"The origination of this renewed attempt to obtain Government power over the operations of Literary and Mechanics' Institutions, Libraries, and Museums, was soon traced to the office of the Committee of Privy Council of Education, and the undersigned are sorry to add they cannot altogether acquit the Society of Arts of all participation in the scheme."

I shall be obliged by your informing me, at your earliest convenience, whether in this paragraph it is intended to impute to me individually any share whatever in the origination or promotion of any attempt to obtain Government power over the operations of Literary and Mechanics' Institutions, Libraries, Museums, and other similar bodies—and, if such an imputation is intended, I have then to request that you will furnish me with a clear statement of the grounds on which it is made.

I am, dear sirs,
Your faithful servant,
HARRY CHESTER.

To J. W. Hudson, Esq., Ph. D., and E. Hutchings, Esq.

Highgate, near London, Sept. 27, 1854.

Dear Sirs,—Having waited for more than a fortnight without receiving from you any reply to my letter of the 11th inst., I am under the necessity of publishing it, with this further communication, in the *Journal of the Society of Arts*.

As I am the only person both in "the office of the Committee of Council on Education" and a member of the governing body of "the Society of Arts," I conclude that I am the person pointed at in the paragraph to which I have referred.

To anyone who knows anything of my sentiments, it must seem simply absurd to charge me with a design "to obtain Government power over the operations of Literary and Mechanics' Institutions, Libraries, and Museums" or other similar bodies; but, as some persons may suppose that you could not have made such a charge without some foundation of truth, I think it worth while to assure them that no word nor deed of mine has ever aimed at the bringing of the Institutions under the power of Government; and that, whenever an opportunity has arisen, I have invariably advocated the absolute independence of those bodies.

I was one of the deputation from the Conference to Mr. Hutt, and on that occasion expressed strongly my opinion against the introduction of a power of appeal to any Government office. It was arranged with Mr. Hutt, that the appeal should be to the Charity Commissioners, a judicial body. I had nothing whatever to do with the Bill afterwards. I had no communication with any peer respecting it. I did not know who had charge of the Bill in the Lords; and it was not until some days after the act had received the Royal assent that I became aware that the appeal to the Board of Trade had been inserted, or had been even proposed to be inserted in the Bill.

To judge from your letter, one would suppose that the Act was a penal and restrictive act, whereas it is one of enfranchisement and privilege, conferring on Institutes advantages hitherto conferred on no other bodies whatever.

There is but one blot in the statute—the clause which gives a power of appeal to the Board of Trade, a Government office; and for this blot we have to thank none but yourselves and the other gentlemen who were set in motion by your unwarrantable suspicions and by your well-meant but erring activity.

Anyone of ordinary judgment might have foreseen that the House of Lords would not give to any bodies whatever an unlimited power of altering their constituted objects. Such a power is never given, even under Royal or Parliamentary charters. The bill submitted to the Conference, and previously approved by yourselves, had guarded this power by securing to a dissentient minority the right of appeal to the Charity Commissioners. This was, in fact, to transfer the appeal from the Court of Chancery to the Commissioners. In consequence of some sensible remarks and suggestions which fell from Mr. Baines, Mr. Woollcombe, and other gentlemen, at the Conference, the appeal clauses were considerably modified at Mr. Hutt's on the following day; and Mr. Hutt has stated that the modifications then agreed to were by himself inserted in the bill before it came to a second reading. Your misinformed and misplaced zeal caused the power of appealing to the Charity Commissioners to be entirely struck out of the bill on the third reading. That is all which you did in the Commons; and in the Lords, finding that the bill would not pass without a provision for an appellate tribunal, you, who could not stomach an appeal to the Charity Commissioners—a judicial body—actually consented to the proviso for an appeal to a Government office—the Board of Trade! Having done this, you endeavour to throw the blame on Mr. Hutt, the Society of Arts, and your humble servant.—Quis tulerit Gracchos de seditione querentes!

Yours faithfully,
HARRY CHESTER.

To J. W. Hudson, Esq., Ph. D., and E. Hutchings, Esq.

Proceedings of Institutions.

Camberwell.—The autumn course of lectures at the Institute for the Industrial Classes commenced on the 13th instant, with an entertainment by Mr. George Buckland, entitled, "Schoolboy Anticipations." The syllabus includes lectures by the Rev. John Burnet, Drs. Letheby and Pettigrew, and Messrs. A. Francis and George Grossmith.

* Society of Arts Report on Industrial Instruction, p. [illegible]

LIVERPOOL.—Mr. William Hughes has been giving four public lectures this month, at the Collegiate Institution, on Physical Geography. The first was on the Baltic and Black Seas, the second on the Coral Islands of the Pacific, the third on Earthquakes and Volcanoes, and the fourth on the Arctic Regions. At these lectures a large number of masters, mistresses, and pupil teachers of National and other schools were present. In the month of April four lectures were given by Dr. Edwin Lankester, on Vegetable Physiology; and lectures by Mr. T. C. Archer, on Economic Zoology and Economic Mineralogy, are announced for November.

LYNN.—On Friday evening se'nnight a public meeting was held in the Hall of the Athenæum for the purpose of presenting a testimonial to Henry Edwards, Esq., first President of the Council of the Athenæum, as a mark of public approbation for his unwearied exertions in promoting the erection of that building, and the interests and objects of the various Societies for whose accommodation it is provided. The testimonial consists of a very handsome bronze statuette of "Penelope." Its cost was 43*l*., which sum was provided by public subscriptions (not exceeding 10s. 6d. each) raised in a very brief period.

NORTHERN UNION OF MECHANICS' INSTITUTES.—The annual meeting of the Northern Union of Mechanics' Institutes was held on Wednesday, the 13th inst., at the Mechanics' Institute in South Shields, (Robert Ingham, Esq., M.P., in the chair). Delegates were present from most of the Institutions in Union. The secretary, Mr. J. L. Thornton, read the report of the Council of the Union. Since the meeting at Hexham, in 1853, the Bywell, Newhouse, Allen Smelt Mill, and Allenheads Institutions had been admitted, and Carlisle was an applicant, making the total number 35. In connection with many of the Institutions in Union, Penny Savings Banks and Benefit Clubs had been formed. Mr. J. G. Grant, the lecturer of the Union, had lectured before nine Institutions, and his services continued to be highly efficient, and were greatly esteemed. The Itinerating Libraries were still one of the most useful and valuable features of the Union, and had been copied in other districts. Books, received as donations from various sources, had been distributed among the several Institutions. The receipts of the year consisted of £9 17s. in subscriptions, and £3 3s. in donations: total £13. The disbursements had been £10 1s. 1d., leaving a surplus of £2 18s. 1d. By the liberality of Mr. Beaumont, M.P., the Union had been connected with the Society of Arts, and now enjoyed all the advantages attendant upon such connection. The distribution of parliamentary papers, &c., to Mechanics' Institutes had not yet been carried out; but the Council trusted that the project, the execution of which had been interrupted by the death of Mr. Tufnell, M.P., would be successfully accomplished. They also suggested that the Mechanics' Institutes should form funds for the conveyance of subscribers to the Paris Exhibition of 1855. Four honorary associates were recommended for election, viz., Mr. J. G. Grant, Bishopwearmouth; Dr. Hudson, Manchester; Mr. J. Hole, Leeds; and Mr. M. Ross, late secretary to the Newcastle Mechanics' Institute. The Council recommended that the rate of annual subscription should be lowered to 5s. in case of Institutions having 200 members and upwards, and 2s. 6d. when the members fell short of that number. The report directed attention to Mr. Hutt's Literary and Scientific Institutions Act; to the facilities afforded by the Department of Science and Art for the establishment of Schools of Design; and recommended as subjects for discussion at the present meeting—1. The Free Distribution of Parliamentary Papers to Mechanics' Institutes.—2. Mr. Hutt's Bill.—3. The Law as to Exemption of Literary and Scientific Institutions from Payment of Local Rates.—4. The Paris Exhibition of 1855. The report having been unanimously adopted, the questions for discussion were then taken into consideration. With regard to the first question, the general opinion seemed to be in favour of a distribution of the papers, as proposed—each Institution receiving such as might be most suitable for its locality. Mr. Thornton explained the provisions of the recent Literary and Scientific Institutions Act, and referred to objections which had been raised against one or two of its clauses, and which, he thought, were without foundation. Mr. Milner Gibson, it was stated, intended to introduce a bill to amend the existing law in reference to the exemption from payment of local rates. A general disposition was evinced to promote some scheme for facilitating visits by working men to the Paris Exhibition of 1855, and making them as pleasant and profitable as possible. It was agreed that the next meeting of the Union should be held in Newcastle, and it was proposed and carried by acclamation that Earl Grey be the President for the ensuing year. After the business meeting about one hundred gentlemen sat down to dinner. Mr. Ingham, M.P., was again in the chair, and was supported on his right by the Mayor of South Shields (John Robinson, Esq.), William Hutt, Esq., M.P., Rev. James Carr, William Anderson, Esq., J.P., Frank Clint, Esq., Liverpool, J. Gregor Grant, Esq., (author of *Madonna Pia*), and Mr. J. L. Thornton. On his left were the Rev. Temple Chevalier, Philip H. Howard, Esq., J. B. Blackett, Esq., M.P., William Bracy, Esq., and A. S. Stevenson, Esq. The vice-chairs were filled by Richard Shortridge, Esq., and Thomas Salmon, Esq. The usual loyal and national toasts having been given, the Chairman gave the toast of the day—"Prosperity to the Northern Union of Mechanics' Institutes," coupling with it the name of Mr. Philip H. Howard, of Corby Castle, who had been president at the preceding annual meeting at Hexham. This was followed by "The Delegates," "The Officers of the Union," "Continued Prosperity to the Mechanics' Institutes of South Shields," given by Mr. W. Hutt, M.P., "The President Elect," by Mr. Blackett, M.P., &c., &c. In the evening there was a soiree, when Professor Chevalier, of Durham University, made some remarks on the recent progress of physical science, calling attention particularly to experiments now being made by Professor Airy to ascertain the material of which the earth is composed. Mr. Hutt offered some observations on the mean, for extending more widely the benefits of such Institutions, and he was followed by Dr. Winterbottom, Mr. Blackett, Mr. Philip H. Howard, &c., &c.

Miscellanea.

MUSEUM OF ORNAMENTAL ART.—The Museum at Marlborough house will be re-opened on Monday next. During the recess the specimens have been re-arranged and considerable addittions have been made. The collection of arms from the Royal Armoury at Windsor will continue to be exhibited. An alteration has been made in the days of admission; in future the Museum will be opened on Saturdays, which will be free days, instead of Tuesdays. This change has been made chiefly with the view of enabling the schools in the metropolis to send their students to visit the Museum on the afternoons of Saturdays.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Sept. 22nd*, 1854.]

Dated 9th June, 1854.

1279. J. Bernard, Club chambers, Regent street—Stitching machines.

Dated 16th August, 1854.

1782. W. C. Forster, 84, Hatton garden—Gas.

Dated 21st August, 1854.

1832. R. Brisco, St. Bees, and P. S. Horsman, St. John's, Beckermet, Cumberland—Preparing fibrous substances for spinning.

Dated 4th September, 1854.

1926. J. Fish, Livesey, near Blackburn, and J. Thompson, Witton, near Blackburn—Picking warps.
1928. G. M. Miller, Dublin—Axle boxes.
1930. W. Hill, Congleton—Doubling raw silk.
1932. W. H. Mitchel, Brooklyn, U.S.—Distributing type.
1934. F. A. Skidmore and J. Bolton, Coventry—Cast-iron pipes.

Dated 5th September, 1854.

1937. W. Brownfoot, Leeds—Adjusting venetian blinds.

1938. F. X. A. Fauvelle, Paris—Cleaning dressing combs. (A communication.)
1939. H. Trappes, Manchester—Preparation of leather to be used in the manufacture of a new flock,—for paper making, &c.
1940. S. Stocker, Brighton—Coverings for human body.
1941. W. Barnes, 2, Royal Exchange buildings—Fastening rails of railways.
1942. J. H. Pape, Paris—Wind musical instruments.
1943. J. P. Trimble, New York—Regulating temperature in, and ventilating conservatories.
1944. J. H. Pape, Paris—Pianofortes.

Dated 6th September, 1854.

1948. W. Newbould, Derby—Busks for stays.

Dated 7th September, 1854.

1950. G. P. Wheeler, 4, Bellevue place, Mile end road, and S. Bromhead, 38, Holford square, Pentonville—New fibrous material, for cordage, matting, fabrics, pulp, &c.
1952. W. Johnson, 47 Lincoln's inn fields—Coating iron and steel wire with other metals or alloys. (A communication.)
1954. R. Adams, King William street, City—Breech-loading fire-arms. (A communication.)

Dated 8th September, 1854.

1956. J. Burns, Manchester—Ventilating ships.
1958. J. Jones, Sheffield—Metal dinner and dessert forks.
1962. R. Macallister, Glasgow—Screw propeller.
1964. E. Travis, Oldham—Apparatus for measuring water and other fluids.
1966. J. Bernard, Club chambers, Regent street—Boots and shoes.
1968. B. Hustwayte, Hockley street, Homerton—Metal roofing.

Dated 9th September, 1854.

1970. A. Guyardin, Paris—Fibrous matter for paper, &c.
1972. W. Bowler, Southwark bridge road—Hats.
1974. T. Clowes, Beverley—Muzzles for horses.

Dated 11th September, 1854.

1976. J. Rigby, Dublin—Fire-arms and guns, and waddings.
1978. J. Norton, Cork—Ropes, bands, and cordage.
1980. S. Szontagh, Paris—Sewing machines.

Dated 12th September, 1854.

1982. M. Billing, Birmingham—Furniture castors.
1986. E. Morewood and G. Rogers, Enfield—Baths for melting metals for coating other metals.

Dated 13th September, 1854.

1988. W. Nash and J. Jewell, Islington—Window sashes and frames.
1990. A. E. L. Bellford, 16 Castle street, Holborn—Electro-magnetic clocks. (A communication.)
1992. A. H. A. Durrant, Tongcastle, Salop—Axle and axle box.
1994. H. Crosley, Camberwell grove—Paper, millboard, and felt from new materials.

WEEKLY LIST OF PATENTS SEALED.

Sealed September 19th, 1854.

741. Alfred Augustus De Reginald Hely, 13a Cannon-row, Westminster—Improvements applicable in exhibiting artistical, natural, or other objects on a large scale.
1495. George Beard and William Beard, Cannon street—Improved needle depositor.

Sealed September 22nd, 1854.

685. Laurence Whitaker and Doctor Ashworth, Haslingden—Improvements in power looms for weaving.
704. George Beaumont, Halifax—Improvements in machinery or apparatus for the manufacture of solid, hollow, and ornamental bricks.
708. Frederick Phillips, Downham, near Brandon—Improvements in machinery or apparatus for cutting, grating, or preparing vegetable substances.
757. Thomas Scott, Brighton—Improvements in machinery for propelling.
769. William Ashdown, 167 Piccadilly—Improvements in gas stoves.
788. John Weston, Norwood—Improvements in transmitting and applying motive power for propelling railway trains, ships, boats, barges, and such like vessels, and for other useful and mechanical purposes.
793. Simon O'Regan, Liverpool—Improvements in engine-boiler furnaces, and other furnaces.
814. John Rankin, Liverpool—Improvements in machinery for cleaning corn and seed.
815. Henry Bollmann Condy, Battersea—Improvements in concentrating beer, ale, cyder, wine, and vinegar.
840. Felix Lieven Bauwens, Pimlico—Improvements in distilling fatty bodies, and in stills or apparatus for such distillation.
855. William Henry James, Camberwell—Improvements in marine and other structures.
888. Samuel James Healey, Over Darwen, near Blackburn—Improvements in apparatus applicable to steam boilers for preventing explosions and saving fuel.
908. Robert Richardson, 26 Great George street, Westminster—Improved method of joining or securing the joints of pipes.
975. James Fenton, Low moor, Bradford—Improvements in safety valves.
1166. Edouard Carl Mantrand, Paris—Improvements in the manufacture of phosphorus.
1189. William Northen, Vauxhall walk, Lambeth—Improvements in the manufacture of mangers and troughs for stables.
1212. David Duncan, Oak Foundry, Crofton—Improvements in railway points or switches and crossings.
1359. Oliver Rice Chase, 17 Cornhill—Improvements in machinery for manufacturing lozenges and for other purposes.
1446. George Hutchison, Glasgow—Improvements in the manufacture of soap.
1510. Stephen Martin Saxby, South Lambeth—Improvements in making fast and letting go the cords of window blinds, which said improvement or improvements may also be applied to the fastening and letting go of ropes, cords, lines, wires, and chains for various other purposes.
1564. Joseph Spires, Cleveland street, Fitzroy square—Improvements applicable to boots and shoes.
1636. John McGaffin, Liverpool—Improvements in constructing and applying heads to metal casks and vessels.
1644. Edmund Alfred Pontifex, Shoe lane, and Charles Glassford, of Ashburnham grove, Greenwich—Improvements in obtaining soft lead from hard lead, for the separation of the impurities in hard lead, and for the separation of antimony from these impurities.
1688. Thomas Ridgway Bridson, Bolton le Moors—Improvements in preparing cotton for manufacturing purposes.

Sealed September 26th, 1854.

714. Alfred Hodgkinson, Springfield Bleach Works, Belfast—Improvements in bleaching linen fabrics.
716. Henry Francis, West Strand—Improvements in machinery for crushing, grinding, washing, and amalgamating quartz and other matters containing gold or silver.
733. Philip John Passavant, and John Cure, Bradford—Improvements in machinery or apparatus for combing wool and other fibrous substances.
766. Joseph Bentley, Liverpool—Improvements in breech loading fire-arms.
789. James Smith, St. Leonards-on-Sea—Improvements in the construction of railways.
897. Edward Briggs, Castleton Mills, near Rochdale—Improvements in machinery and apparatus for finishing yarn and thread.
893. Charles Watt, 17 Gloucester gardens, Kentish town—Improvements in bleaching hemp, flax, and other fibrous substances.
898. Jean Daniel Pfeiffer, Paris—Improvements in book-binding.
916. Frederick Buonaparte Anderson, Gravesend—Improvements in spectacles and eye-glasses.
926. Pierre Jean Felix Mouchel—Improvements in melting and in treating the ores and metals.
933. David Buddo, St. Andrew's, Fifeshire—Magnetic weather gauge to give warning of the approach of gales and storms, &c.
986. Robert James Mary'on, 37 York road, Lambeth—Improvements in the construction and manufacture of anchors.
1011. Vincent Wanostrocht, 90 Great Tower street—Improvements in the construction of cannon, and in projectiles to be used therewith.
1067. Auguste Edouard Loradoux Bellford, 16 Castle street, Holborn—Improvements in carriage axles and their boxes.
1126. Auguste Edouard Loradoux Bellford, 16 Castle street, Holborn—Improvements in looms for weaving.
1427. William John Bisseker, Birmingham—Improved method of labelling bottles and such other vessels or articles as require or may require labelling.
1514. Edwin Wolverson, Ashton-juxta-Birmingham—Improved lock.
1845. Alexander Southwood Stocker, 11 Poultry—Improvements in axles.
1859. Thomas Chambers, junior, Colkirk, Fakenham—Improvements in machinery for distributing manure.
1624. George Ferguson Wilson and George Payne, Belmont, Vauxhall—Improvements in distilling fatty and oily matter.
1633. Thomas Bell, Don Alkali Works, South Shields, and Henry Scholefield, also of South Shields—Improvements in the manufacture of borax.
1635. Julius C. Hurd, Medway, Massachussets—Improved machine and process for picking, burring, and cleaning cotton wool, and for tearing up and reducing old fabrics to be re-spun.
1642. Auguste Edouard Loradoux Bellford, 16 Castle street, Holborn—Improved mill for grinding paint and other moist substances. (A communication.)
1650. Auguste Edouard Loradoux Bellford, 16 Castle street, Holborn—Improvements in soldering metals.
1669. James Gilbertson, Hertford—Improvement in supplying air above the fuel in furnaces.
1681. Henry Walduch, 5 Warwick court, Gray's inn—Improvements in propelling vessels.
1693. James McGaffin, Liverpool—Improvement in the manufacture of sheet metal pipes.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Sept. 25.	3639	The Flexibility Regulating Pen	Charles Henry Wagner......	76, Cambridge street, Birmingham.

Journal of the Society of Arts.

FRIDAY, OCTOBER 6, 1854.

SUBJECTS FOR PREMIUMS.

The Secretary would be glad to receive suggestions for the list of Subjects for Premiums for the ensuing session, which it is intended to publish in a few days.

THE SCHOOL SYSTEM OF NORWAY.

By Councillor Nissen.

Amica patria, amica schola patria, sed magis amica veritas.

Norway has an area of about 5,750 square miles, whereof about two-fifths are unfit for any sort of cultivation, while of the remaining three-fifths large tracts are covered with scanty wood, and scarcely fifty geographical miles are cultivated in corn fields.

There are in Norway about 1,400,000 inhabitants. Of these about 180,000 dwell in the larger or smaller towns, while the remaining 1,220,000 are spread over the country districts. Generally, only one family dwells in each separate farm-house or cottage, and the distances of these houses or cottages from each other are, in many parts of the country, so great that it is not possible to bring together in any one spot a sufficient number of children to form a school. Herein lies an essential impediment to the satisfactory organisation of the system of schools in the country districts of Norway. A sort of coercive or compulsory system, as regards the education of children, has been in operation, according to the Norwegian law, since 1739. The parents and guardians of every child are under a legal obligation to instruct, or cause the child to be instructed, in those elementary branches of education which are usually taught in the district schools. Although the law does not actually bind parents to send their children to any school properly so called, and still less to any public school established by the State, yet the result is the same as if it did so as regards the great majority of the lower classes, who are unable and have not time to instruct their children, nor means to pay for their children's instruction in private schools or by private teachers, especially in the country districts, where, as a matter of course, cheap private schools cannot exist together with the public schools. The time during which children must either go to school or receive instruction at home, begins in the seventh or eighth year of their age, and ends at the period of their confirmation, which usually takes place when they are fourteen or fifteen years old. The number of children in the country districts, who are thus under the conditional obligation of going to school, may be taken to be about 198,000, of whom about 4,000 may be supposed to receive instruction either at home or in the higher public or private schools. In the towns the number of such children is about 25,000, of whom about 6,000 may be supposed to receive instruction in private or in the higher public schools. The number of the above-named children attending the district schools may thus be estimated at about 213,000, while the number of those not attending the district schools may be taken to be about 10,000.

The State having thus imposed on parents a duty which they would not usually be able to fulfil, unless there existed, at proper intervals throughout the country, schools to which the children could be sent to obtain the instruction required by the law, it has also, by the same law, imposed on every district (in the country on every parish) the duty of establishing a sufficient number of such schools. It must be remarked that every town forms one municipality, and so does also every parish in the country, a certain number of towns and parishes forming one higher municipal body, called an "Amt" (county), of which there are eighteen in the whole country. This duty is, on account of the local peculiarities of the country above described, connected with great difficulties; and most places have hitherto been forced to make shift with very scantily-endowed schools, where instruction is imparted only during a short time in the course of the year.

The schools in the country districts are divided into stationary or permanent, and circuit or itinerating schools. Every stationary school is attached to the nearest surrounding district, the children of which (as before mentioned) must go to the school, unless their parents provide in another manner for their receiving the instruction prescribed by law. The distance which the children have to go to such a school is usually not more than a quarter of a Norwegian mile, or about two English miles; sometimes, however, it is as much as four English miles. Every stationary school has its house, comprising a school-room and an apartment for the master. Every master at a stationary school has, moreover, besides his salary (which on an average can be reckoned at about 90 sp. drs.*), a free lodging, and a certain portion of land for his own use. The number of stationary schools in the country districts is estimated to be about 380, and the number of children who attend them about 24,000; there are thus, on an average, 63 children to each school. The time of instruction is from 16 to more than 40 weeks in the year; on an average it is about 30 weeks or 180 days in the year. As most of the pupils of these schools are divided into two classes, which attend school on alternate days, each pupil has on an average, opportunity for receiving instruction 90 days in the year.

The majority of the children belonging to the country population attend the circulating or itinerant schools. Every parish, which usually contains several churches, with their separate church districts, is divided into school districts. Every such school district not possessing one of the above described stationary schools is again sub-divided into several "Roder" (sections or circuits), the children of each of which attend the school together. Thus, although the whole district only has one teacher, there are in reality as many schools as there are sections or circuits in each district. A district for a circulating school consists commonly of three or four sections. The teacher goes round from one section or circuit to another to keep school. According to law, the youth of each circuit are to receive instruction during at least three months, or, where this is not possible, during at least two months in the year; but the fact is, that in some places the children in the circuit schools receive instruction during 12 weeks, but on an average during not more than eight weeks over the whole country. The school is not, however, kept uninterruptedly in the same spot while within the limits of the same circuit. It is the duty of every farmer (Gaardmand) or small proprietor in the circuit, each in his turn, to provide a proper school-room in his own house, and to give the teacher board and lodging for a certain time, which is usually in proportion to the extent of the estate. The teacher usually moves with the school every week to a new house. The eight weeks in each year, during which the instruction is usually given by these schools in each circuit are not consecutive, but distributed in several terms at various times, from October to April, that part of the year within the limits of which all the instruction of the circuit schools in most places begins and ends. In some places the teacher of the circuit school gives instruction also during some of the summer months, having either a district consisting of a greater number of circuits than usual, or to teach in each circuit during a greater number of weeks than the minimum required by law. The salaries of the circuit schoolmasters are very different. In some parts of the country only 12

* One pound sterling is equal to four specie dollars and half.

sp. drs. are given, besides board and lodging in school time, for 30 weeks' teaching yearly, while in other parts the salary is 40 sp. drs. The whole number of such itinerating schoolmasters is about 2000, and of circuits about 7000.

According to the existing law on district schools in towns, every town is bound to establish so many schools that every child can receive two days' instruction per week all the year-round, with the exception of the usual vacation, no teacher having on the same day more than 60 pupils. The district schools in towns are usually so arranged that every child receives two or three days' instruction weekly. In most places each school is provided with only one teacher, who, where each child is to receive three days' instruction weekly, teaches, on alternate days each of the two classes into which the children belonging to the school are divided; while in places where each child is to receive two days' instruction weekly, he teaches every third day each of the three classes into which the children belonging to the school are in that case divided. The division into classes is usually regulated by the advancement of the pupils in knowledge. In places where the children have access to the school two days in the week, each child will be able to attend school about 84 days in the year, and in those places where the children have access to the school three days in the week about 126 days in the year.

What has been above remarked concerning the time of instruction in the different classes of district schools applies only to that time during which the children have an opportunity of receiving instruction, and not to the time of instruction whereof the majority of the children actually avail themselves. Parents can indeed, according to law, be punished by the infliction of fines when their children, from having neglected to attend school, have not made such progress as they ought to have made: but in practice, this measure is seldom or never adopted unless the neglect appears to have taken place in a very remarkable degree. The fact is, that the children who attend circuit schools do not on an average actually receive instruction during more than four weeks in the course of the year. It must, however, be observed that during the year, or at least the half-year, immediately preceding their confirmation, which usually takes place in the interval between the 14th and 15th year of their age, the clergyman of the place gives the children who are to be confirmed instruction in religion, several hours weekly, besides the instruction which they receive at the schools. Moreover, according to the existing law for the organisation of schools in the country, all children above 12 years of age are bound, until 2 years after confirmation, to appear in church at the public catechisms which are conducted by the clergyman in connection with the usual divine service, and are held several times a year in each church. It must also be observed that in many of the country districts the parents are anxious, as far as they are able, to assist the school in giving their children religious instruction particularly. As regards those children who belong to the permanent schools in the country, the disproportion between the opportunity of receiving instruction and the instruction actually received is not so great as it is with respect to those who belong to the circuit schools. The same remark may be, on the whole, applied also to the schools in towns.

According to law, instruction is to be given at the district schools, as well in the country as in towns, in reading, religion, singing, writing, and arithmetic. School begins and ends every day with prayer or psalm singing, or both. In a number of circuit schools, the instruction is, (contrary to law,) limited to reading and religion, and in the great majority of circuit schools the instruction in writing and arithmetic does not extend beyond the first rudiments. As the circuit schools are kept alternately in the houses of the several farmers, and very frequently in the same rooms where the inmates are engaged in their daily avocations, there exist, of course, obstacles to the proper organisation and successful operations of the schools. Very frequently the room is also extremely unwholesome, and especially it often happens that all ventilation is impossible, the windows not even being made to open. Drawings of rooms of itinerating schools in different parts of the country and a drawing of the farm where one of these rooms is found, were exhibited at the Educational Exhibition. In many permanent schools, as well in the country as in towns, several other branches of instruction have been adopted; for instance, orthography, and sometimes a little history and geography.

Some superior district schools have been lately established, in which the more advanced children, not only from the nearest surrounding district, but from the whole parish or municipality, besides receiving instruction in religion, writing, and arithmetic, learn the orthography and grammar of their mother tongue, history, geography, mensuration, and the rudiments of natural history and physics, also sometimes a foreign language, usually English or German. The number of such schools is as yet very small, as the municipalities or parishes are not obliged to establish any school of this kind. They however often do so voluntarily, encouraged by the hope of obtaining some assistance from the amount of money which the Storthing (the National Assembly) has granted for the establishment of such higher district schools. In these schools a small sum is usually paid by the pupils; in all other district schools no payment is taken. The expense of the district schools in the country, including the outlay in kind of board and lodging for the circuit schoolmasters, is about 115,000 sp. drs. yearly. The cost of the district schools in the towns may be estimated at about 32,000 sp. drs.; adding to this the sum granted by the state to the five seminaries for teachers, namely about 8000 sp. drs. together with the state subsidies to the poorer districts, it will appear, that the country devotes on the whole about 195,000 sp. drs. yearly to the endowment and support of the district schools, in which about 213,000 children receive instruction.

The district schools are, with few exceptions, but poorly supplied with the means of instruction. This is especially the case with regard to the circuit schools, of which many have (beyond the pupils' own religious books) no other help than some few copies of the New Testament, a psalm book, and a rude but peculiar instrument used in teaching singing, called Psalmodicon, or Monocord, which in many places is also used in family worship. These means of instruction, belonging to the itinerating schools, the master, as a matter of course, takes with him from one farm-house to another, as he moves. All schools established by law lie under the joint management of the municipal authority (Formandskabet) in the towns and parishes and the clergyman of the parish. No tax can be levied towards the support and improvement of schools, but after a grant of the municipality, which, however, by the law is bound to grant the means absolutely necessary to establish and keep up proper schools.* The head management of such schools is vested in a board, called "Stifidirectionen," which consists of the high sheriff and the bishop of the diocese, from whom the more important matters of education are sent to the Governmental department for church and education, in order to be submitted to the decision of Government. Dissenters, of which there are but few in Norway, may send their children to school, but they are not obliged to let them take part in the religious instruction, but they, as well as the members of the Established Church are by law bound to attend to the proper religious and temporal instruction of their children.

From the above remarks about the common schools in Norway it will be seen that the instruction given in most of these schools is of a very indifferent kind. But still

*It consequently depends on the people themselves, whether the school is to be properly developed or not.

the great bulk of the population does not stand low in point of education when compared with the people of other countries; this is a consequence partly of the fact that no child grows up quite destitute of education; and partly to the cultivating and improving impulses found within life itself out of school. That the clergyman of the parish has the charge of the religious instruction of the children, and that the parents also very often pay a great deal of attention to this point, has been remarked above. The farms being spread widely over the country certainly increases the difficulties in properly arranging and fitting up the school, and also excludes the improvement that frequent intercourse with a great many other people is sure to bring about; but, on the other hand, it gives the life within each family a direction by which the mind of the individual is turned inwards, and creates a desire of reading, and of thinking closely over what has been read. The grandeur of the scenery in many parts of the country excites the imagination, and keeps up and develops the poetic element in the mind. Singing and narrations of old stories and traditions from the remotest times—nay, even poetical contests—therefore, form a peculiar feature and an essential part of the social entertainment of the peasants of Norway, especially in the mountainous parts, when they meet at weddings, and on other festive occasions. The many dangers by which nature has surrounded the Norwegian peasant, and the many difficulties that he has to struggle against in various parts of the country, strengthens his courage and sharpens his wit and acuteness. But more than anything else the peculiar social and political station of the Norwegian peasant contributes to promote the development of his mental faculties, though but inefficiently begun in the school. Even when the country of Norway was during its union with Denmark deprived of national independency, the Norwegian citizen and peasant enjoyed personal liberty and social independence. The Norwegian "bonde," or yeoman, has never been oppressed by a predominant nobility, who never gained any ascendancy there. His feeling of liberty and independence is, therefore, strongly developed. Add to this, that the whole country is divided between a great many small proprietors, whose farms, however, are large enough to render it necessary for them to employ eight or twelve horses for the proper cultivation of their fields; and this affords an opportunity to the proprietor to spend much of his time in the study of, more or less, practical science. There is, therefore, comparatively speaking, a very large number of persons whose social position not only allows but induces them to cultivate their own minds, and take care of the education of their children. They are still more induced to do so by their political position. Every landed proprietor, however little his property may be, has a vote, and may himself be elected as a member of "Formandskabet" (the municipal authority), and of "Storthinget" (the National Assembly). At present more than half the members of the Storthing are peasants, and many among them, who have received no instruction but what the common schools above-mentioned have been able to give them, have, by the agencies of life itself, been prompted by their own exertions to acquire such an amount of knowledge, and their mental faculties have been so much developed, that they in the Storthing make most pithy and eloquent speeches upon all political and social subjects.

Of the 10,000 children who do not belong to the district schools about 4,000 may be supposed to receive instruction at home from parents, tutors, or governesses. Of the remaining 6,000, about one-half attend private schools, which are about on a par with, or very little superior to, the better class of district schools in the towns. The other half, or about 3,000, may be supposed to attend higher public or private schools, both for girls and boys, but principally the latter. Among these schools the so-called Burgher schools should be first-mentioned, of which there are more than twenty in different towns. There are public schools, in many of which girls are also educated, but in separate classes or sections. The branches of instruction in these schools, which in the smaller towns have two or three, and in the larger towns four or five or more teachers, are usually reading, writing, arithmetic, religion, orthography and grammar of the mother-tongue, one or more of the foreign languages—German, French, and English,—history, geography, the rudiments of mathematics, and sometimes the rudiments of drawing, natural history, and physics. The most completely endowed Burgher schools are called "Real" schools. Thus, Christiania, Trondhjem, and Bergen have each a "Real" school, established partly by the public, and partly by private legacies. In Christiania there are also several more or less complete private "Real" schools. The whole amount of expenses for the Burgher schools is about 30,000 sp. dollars.

In eleven towns there exist (usually instead of, but sometimes besides, the Burgher schools) public Real schools, established by the State, which are placed in connection with the learned schools (Latin schools) established by the State. The peculiarity of the arrangement of these schools is, that the lower classes (until the pupils complete their 12th year as a normal age) form, as it were, a common trunk or stem, from which there afterwards issue two branches, the Latin school and the Real school. The first of these, the Latin or learned school, imparts during five or six years, to those who desire to go to the University, a special preparatory instruction, of which the classical languages and their literature form an essential part. The other branch, or the Real school, imparts a suitable preparatory instruction to those pupils who are destined, after completing their fifteenth or sixteenth year, to enter on practical life, or to attend higher technical or commercial special schools, (of which there are scarcely any in this country,) or to enter the military school. The branches of instruction in the united Latin and Real schools are in the common classes—the mother-tongue, writing and drawing, singing and gymnastics, arithmetic, religious instruction, geography, history, natural history, German, and French. In the Latin classes of the united schools the branches of instruction are as follows—the mother-tongue, religious instruction, geography, history, German, French, mathematics, Latin, Greek, and Hebrew. In the Real classes instruction is given in the mother tongue, religious instruction, geography, history, natural history, German, French, English, mathematics, natural philosophy, writing, and drawing. In some of these schools the highest Real class gives the pupils a special preparation for commercial life by instruction in commercial correspondence, book-keeping, the properties of goods, &c.

In Christiania there are some private Latin and Real schools, the organisation of which is in all essential points the same as the public schools It must, however, be remembered, that while all the classes in the private school described have annual courses, the classes in the public Latin and Real schools have generally biennial courses, whence it follows that the number of classes in the latter is reduced to about half the number adopted in the former; and the total course of the learned school is likewise, on account of its less perfect organisation with biennial classes, accomplished in six years. Five of these schools have also a less complete arrangement in the higher classes, the highest biennial Latin class being wanting; they cannot, therefore, send pupils directly to the University, and are frequently called, to distinguish them from the others, "Middel-og Real skoler." In the eleven public Latin and Real schools the number of pupils is altogether 700. There are also three public learned or Latin schools, which are not connected with Real schools, viz., in Christiania, Trondhjem, and Bergen. They are destined, as well as the Latin schools which are connected with Real schools, to prepare those who intend to complete their education at the University. Their organisation differs from that of the united Latin schools only inasmuch as they have retained the old arrangement in the study of languages, according to which the Latin language is to be learned before the

modern languages; this order being reversed in the Latin schools which are connected with Real schools. The number of pupils in the three independent Latin schools is altogether somewhat over 300. These three schools are supported by their own resources, which they have obtained partly by legacies, and partly by endowments from the State in former times. Their yearly income arising from interests and from payments of pupils amounts altogether to about 28,000 specie dollars, which amount is, however, not wholly expended for the necessities of the schools. Adding to this 36,000 sp. drs., which sum represents the income of the combined Latin and Real schools, arising from pupils, payments, and contributions from the public and the State. The result is 64,000 sp. drs. as the total sum annually devoted to the support of the public learned and Real schools. As to the masters in the public Latin and Real schools, it must be observed that nobody can be appointed as a "Rector" (or manager) of such a school unless he has first passed the first two examinations, common for all students in the university, namely, in the ancient and modern languages, history, geography, mathematics, and natural history, and after that the so-called philological examination. Vide "Academiske Love for Studerende ved det Kongelige Norske Fredriks Universitet," p. 18, sec. 12, and p. 40. Nobody can be appointed an "Overlærer" unless he has passed the examinations just mentioned, or the examination in divinity, or the examination by law, of 15th September, 1851, required to be passed by all who wish to be Real teachers.

The highest academy for public instruction is the University in Christiania. It has 31 professors, a very considerable library, and several valuable collections. 60,000 specie dollars per annum is the amount devoted to the University.

Besides the schools hitherto enumerated, there should also be mentioned, as belonging to the general system of education, the Asylums, established in many towns, where little children from two to seven years old, stay during the daytime, while their parents are at work; and where they are not only taken care of, but also instructed in the first elements. These asylums are supported partly by the public funds, but chiefly by voluntary annual contributions. The amount applied to the support of Asylums in the country cannot, on the whole, be estimated at more than 6,000 sp. dollars.

An institution for the instruction and education of the deaf and dumb has been established by the State at Trondhjem, and there are also three private institutions for the instruction of deaf and dumb children, which are supported by the State.

Among those schools whose instruction takes a more special direction, must be named agricultural schools, drawing schools, and sailors' schools, which are all calculated for adult pupils, who have passed through the ordinary primary schools. Of agricultural schools there are fourteen. They receive young men at the age of about 18 to 20 years. A more comprehensive account of the orginisation of agricultural schools may be found in the detailed description of the agricultural school at Munkvold, near Trondhjem. Of public drawing schools there are eight, which are supported partly by the public, and partly by the State. Their aim is chiefly to impart to mechanics' apprentices the necessary knowledge of drawing; besides which there are usually lectures on the rudiments of practical mathematics and physics. The yearly cost of these drawing schools is about 6000 sp. dols., whereof one-half is applied to the drawing school at Christiania, which on this account is far more completely endowed than the others. From this school, various means of instruction and several works executed by the pupils, were exhibited at St. Martin's Hall. Of sailors' schools, to which both the state and the respective communities furnish contributions, there are as yet only few. In many places, especially in the towns, there are Sunday schools, whose object is to impart to adults that elementary instruction, which they had not opportunities of acquiring in their childhood. For this purpose instruction is usually given during a few hours in the morning or evening in reading, writing, and arithmetic, sometimes also in the orthography and grammar of the mother-tongue, and likewise in history and geography. Besides this, instruction is generally given in religion, or portions of Scripture are read. The cost of the Sunday schools is very inconsiderable, and is defrayed either from gifts or by public subscription.

On establishing a calculation of what the country devotes on the whole to the support of the lower and higher schools, both public and private, before mentioned, the amount must be supposed to be about 350,000 dols., not including the land possessed by the masters of the permanent schools in the country.

THE DOCTRINE OF HEALTH AND THE NATURAL HISTORY OF MAN, AN ESSENTIAL BRANCH OF ELEMENTARY KNOWLEDGE.

By Adolph Bach, Legal Agent, London.

Deeply impressed with the importance of the introduction of systematical instruction in the doctrine of health and the natural history of man, in the lower and upper schools for the people in Germany, I made a proposal, during my present casual stay in that country, on the occasion of a meeting of school teachers held in Mayence, the first day of this month, to the following effect:—

1. "That the doctrine of health combined with the knowledge of the human body as a substantial branch of the instruction necessary for all men of every station in life, has been hitherto entirely neglected in all schools as an object of elementary as well as of higher instruction.

2. "That this neglect, as well for man as an individual as also for the state of society in general, is productive of the greatest disadvantage.

3. "That our time of peace and the endeavours to exercise a salutary influence on the present and future races, through the perfecting of instruction, renders it necessary earnestly to meet this great evil."

In order that the doctrine of health, as a branch of instruction, should be introduced as well in the elementary as in the higher schools, I made the proposal to offer:—

a. A premium of ten ducats in gold for the best treatise upon the doctrine of health suited to elementary instruction—the selection of the prize essay to be given to five competent men, that is, two physicians and three school teachers.*

b. For the space of three years to offer yearly the sum of thirty florins, as a remuneration to a school teacher who, from the commencement of the next year, 1847, shall give instruction in the doctrine of health at least for two hours weekly, with the sanction of his superior scholastic, ecclesiastical, or civil authorities. After the public examination of the children in this branch of knowledge, a testimonial of it should be given by such authorities. All further considerations, such as the sending in of treatises, &c., should be left to the meeting. The meeting determined to insert the proposal in the minutes of their proceedings; only that it did not come within their object as a temperary assembly to carry the proposals into effect.

An attentive consideration will show that this branch of instruction, next to religion, is the best means of leading man to greater morality, to a mastery over his passions and desires, and to domestic love of order and comfort, whilst in the state it tends to maintain a healthy and powerful population, and to counteract its degeneracy; and its importance appears in my humble opinion so great, that the carrying it into effect should not be left to depend on the views and disposition of an individual school-

* I am happy to be able to observe that J. G. Fischer's little handbook of useful knowledge contains some good hints upon this branch of knowledge.

master. It is, in fact, a national affair, and the reputation of having a good system of instruction which Germany has long enjoyed, can only be more firmly established by the general introduction of this new branch of popular education.

It is of equally essential benefit to the poor and to the rich. To most of the working classes health, and consequently capacity for work, is their only capital. The diseases of the poor, often arising from carelessness and neglect, lead them only to greater impoverishment, without their being able to help themselves, and they become a burthen to the State or to the community. The fault of this is generally to be attributed to the school, because it has not called the child's attention, in its tender age, to this object, which will alone induce him, as a man, to take into consideration the means of better preserving his most precious treasure—his health. Let one only enter the dwellings of the workmen, yes, even of many tradesmen, and look at the want of all sense of cleanliness, or the enjoyment of a pure air; nor should we observe amongst persons of the wealthier classes so many improprieties, had better principles for the preservation of health been instilled into them at school.* The man, on the contrary, who knows how to preserve his health, not from a timorous weakness, but from a free sense of self-knowledge, as it has been taught him at school, gives certainty to the State of the assurance of a useful member, because he has already adopted in his own person rules of prudence and order, and has not, out of ignorance, given himself up to hurtful habits or practices. The teacher, penetrated with good-will towards his scholars and pupils, will seldom find better means of imparting them with a feeling of the might and wisdom of God, and of exciting them to heartfelt thanks to our Creator, than by this doctrine of health, and by the knowledge of our own organisation, and the benificent effect of these impressions pervade through his whole life, because it comes home to the feelings of the child himself. It is true that this branch of instruction has been hitherto so neglected that but few teachers could now be found who would themselves possess the necessary preliminary knowledge; and it is, therefore, assuredly the business of the State to remedy this evil, by appropriate lectures, delivered by competent men in school-teaching seminaries. In England, where I have the honour to be a member of the Committee of the British and Foreign School Society, which has the supreme direction of all the Lancasterian schools in the kingdom, little or nothing has been hitherto done in parochial schools for this branch of knowledge; but it begins to dawn in this respect in more recent times, and a work, published by an unknown writer, under the title of "Health made Easy for the People," deserves to be known in Germany also, as the foundation of an elementary work for school teaching.

I should here be prepared to meet the objections that this elementary instruction would make anatomists or physicians of the children, and that it would, therefore, be improper in parochial schools; but this objection is devoid of all foundation. One might, with equal justice, object to instruction in religion, in language, or in mathematics, that it would make theologists, critical linguists, or mathematicians of the children; an objection of this sort is too futile to be worthy of attention. What is really useful is, a good elementary work, in different sections, for the lower as well as for the higher schools.

Baths of Homburg, 14th October, 1846.

COLLEGE FOR WORKING MEN.

Professor Maurice has issued the prospectus of the College for Working Men, which he has laboured so assiduously to establish. The following is the list of subjects on which it is proposed to give lessons:—

"On one evening of the week we shall speak of *Politics*, including under that name questions that refer to laws, social, or as it is called, political economy, home and foreign policy. Starting from the topics that are most interesting to men in this day, we shall show how they are connected with the *history* of our own country and of other countries. This *history* would necessarily lead on to *geography*.

"2. On another evening we shall have lessons on *language*, beginning always with our own. We shall speak of the sources from which its words come; and of its grammar. These lessons can only be profitable if they are illustrated from good books. Hence they will lead to lessons on English *literature*, and those to lessons on *reading* and *elocution*. Hereafter, if any persons should wish for lessons in *Latin* or *French* or *German*, the opportunity will be given them.

"3. On some evening of the week we shall have lessons in *music*, and in another room on *drawing*. Though we do not design our college for a place of amusement, the music lessons would probably lead to occasional concerts as part of the instruction.

"4. One evening in the week will be given to lessons concerning the *human frame and laws of health*.

"5. Another will be devoted to the subjects which most concern the employments in which working men are engaged—to *machinery*, to *geometry*, to *arithmetic*, and *book-keeping*.

"6. One evening will be given to some branch of *natural science—chemistry, geology, mineralogy*, for instance.

"7. On the Sunday evenings there will always be a class *for the study of the Bible*. Out of this may arise classes on *Christian morals* as applied to common life, and on the relation between *divinity* and *natural science*.

EXHIBITION OF THE ARTS, MANUFACTURES AND RAW MATERIALS OF THE MADRAS PRESIDENCY.

The secretary has received the following despatch and its enclosure from the Madras government:—

Banqueting Hall, Madras,
25th July, 1854.

Gentlemen,—I have the honour, by desire of the Right Honourable the President and the members of the Committee, to bring to your notice, through the enclosed copies of an extract from the Minutes of Consultation, dated 14th July, 1854, of the Madras Government, the resolution therein announced to hold, in February 1855, in the Banqueting Hall, Madras, an Exhibititon of the Arts and Manufactures and Raw Materials of the Madras Presidency; and, in doing so, the Committee desire me to solicit from you, at your early convenience, a copy of your published proceedings, and any suggestions which occur to you as likely to aid the Committee to carry out the liberal views of the Madras Government.

I have the honour to be, gentlemen,
Your most obedient servant,
EDWARD BALFOUR, Surgeon,
Secretary to the Committee.

EXTRACT FROM THE MINUTES OF CONSULTATION, DATED 14TH JULY, 1854.

1. The attention of the Right Honourable the Governor in Council has been recently engaged in the consideration of the efforts made in past years for the promotion of objects affecting the improvement of the agricultural and manufacturing industries of this country, and a review of the proceedings already on record in connection with this important and interesting subject has satisfied him that although a willing and generous desire has been manifested by Government to encourage and support individual or combined exertions directed towards the development of the resources of the country, the success

* I will here only mention the immoderate use of drinking and smoking, which undermines the health, and also exercises a prejudicial influence on the financial circumstances of so many persons.

which has attended such efforts has not been satisfactory. Such has been the case with the operations of the Madras Agri-Horticultural Society, whose laudable attempts to introduce the culture of staple agricultural products of commercial value, have been liberally aided by Government by the offer of pecuniary prizes and medals for successful competitors at their annual exhibitions. So little apparent benefit, however, had been derived from this that the Government were at one time disposed to decline any further contributions.

2. To give the matter over as hopeless, however, seems to his lordship in Council inadvisable, and would only form a source of future regret. It is doubtless disheartening to see the prizes offered for competition carried away year after year by the same individuals, and they merchants of European descent, while little or no emulation is excited among the natives, who have remainded indifferent to the efforts made in their behalf. At the same time, it should be remembered that the trial hitherto made has been of short duration, embracing a period of very few years, that the efforts have been rather desultory than combined or continued, that the Government have taken but a secondary part in them, and that they have almost entirely been confined to the Presidency. It cannot therefore be surprising that so little has been achieved.

3. It appears to his lordship in Council that a comprehensive movement on the part of Government would be more likely to be attended with important and rapidly beneficial effects, for it is clear that in the present state of this country, where the objects of such movements are little understood and much less appreciated by the natives, the efforts of private individuals or bodies of men, however well-directed, can hardly be expected to influence the great mass of the people. The Government alone, from its position, is fitted to take the initiative and to impart the necessary impulse, and the effort should be general, generous, and long-continued to ensure success.

4. The object should be to encourage useful productions of all kinds in Agriculture, Manufactures, and in Arts.

5. As regards the first of these branches of Industry, it seems from past experience almost useless to hold any meetings in Madras for the exhibition of agricultural products. Our operations should, on the contrary, be directed exclusively to the provinces and to the native producers, who should be made to understand the object in view and its intimate connection with their interests. It is idle to expect, in the present state of things, that the native Ryot will send his produce to the Presidency to compete for the Government prizes. Local exhibitions and prizes awarded on the spot can alone produce a spirit of discussion and emulation, with their concomitant results. This course was indeed authorized by Government in 1845, but there is reason to believe that the object was never properly and widely known in the provinces, and that the subject has been lost sight of, the order remaining a dead letter in most districts to this day. To ensure success, the subject should be taken up in earnest by the local authorities. Meetings should be regularly held in every Collectorate under the direction of the collectors, who would best know, from their knowledge of the general features and capabilities of their districts, for what productions they were most fitted, and for what articles it would be most desirable to offer prizes. From the exhibition taking place in the provinces, and the respective merits of the products brought forward being examined and discussed and the prizes awarded to the successful competitors amidst a concourse of their own friends and neighbours, the best possible effect may be expected to be produced.

6. The Government also observe that the prizes offered should rather be pecuniary grants than medals, which latter confer a mark of distinction possessing no attraction in the eyes of the generality of the natives, and than which money donations are likely to act as far bett incentives to exertion. This, indeed, is in accordance with the views of the Honourable Court of Directors, as conveyed in a recent despatch dated 5th July 1853.

7. These prizes will, as heretofore, be given by Government, leaving it optional with private individuals, who may be so inclined, to add any extra prizes for particular purposes.

8. It might be found in some cases more advantageous to hold a combined meeting for two or three adjoining collectorates. For example, a meeting might be held at Wallajahnugger, the resort of natives trading with the interior, for the districts of North Arcot, Salem, and Chingleput, at which the collectors of those districts might be present with their establishments and some of the influential landholders of their districts, and this being within easy reach of the Presidency might be attended by the merchants of Madras, as well as some of the officers of Government.

A similar meeting might be arranged by the collectors of Tanjore, South Arcot, and Trichinopoly, at some central spot, and also by the collectors of Bellary, Kurnool, and Cuddapah—but such details should be left to the discretion of the collectors.

9. His lordship in Council considers that it would also add to the effect of the plan if a general meeting were to be held annually for general competition, in which prizes of a higher class should be distributed, and which might be attended, with good effect, by the higher officers of Government, but it could perhaps be brought into operation only by degrees, as the success of the initial measures rendered those of a more comprehensive nature necessary.

10. The primary object to be held in view in encouraging agricultural experiments should be to avoid the prizes being given away to speculators, who may raise small quantities of produce, which is too often over-nursed during its brief growth, and affords no criterion of the facilities for making it a staple product of the country. The prizes should always be given to bonâ-fide farmers, and where the produce exhibited is sufficiently large in quantity to show that the superior product can be raised extensively. It will also be desirable in the first instance, as suggested by the Honourable Court of Directors in their late despatch, No. 24, of 1854, dated 30th May last, that attention should be directed to such subjects as from their abundance or easy cultivation are likely to become valuable as articles of commerce; and further, that specimens of any new products, or of such others as may be exhibited possessing peculiar merit, should be sent to England, in order that their value in the market may be ascertained.

11. The main cause of the failure hitherto of efforts such as those under notice in this country is clearly to be sought in the absence of a steady certain demand for a superior raw product at a more remunerating price than the inferior article will yield the Ryot; but under the increased attention which is now being paid to the general communications of the country, and the prospect of the railways coming into operation at no distant period, it is anticipated that the adverse cause above referred to will at least be partially removed and that greater success will attend similiar future efforts.

12. While his lordship in Council is averse, as already stated, to the continuance of the annual show and the distribution of prizes for agricultural produce, &c., in Madras, it occurs to him that an Exhibition of Arts and Manufactures might be established with advantage in the presidency. It is observed that there is already a School of Industrial Arts in Madras, to which the Government have extended their aid, founded by the praiseworthy exertions of Dr. Hunter, with the object of affording the natives the means of acquiring useful handicrafts, of improving the manufacture of various articles of domestic and daily use, and also, by developing the natural resources of the country, of creating a local supply of several articles in general demand which are now almost entirely imported. These objects would be materially advanced by the pro-

posed Exhibition; and considering the well-known docility of the natives, the Governor in Council is induced to think that under proper encouragement they would make rapid progress, and much good might be effected. He accordingly resolves to establish an Exhibition, to be held at the Banqueting Hall early in the next year. Such an Exhibition might probably be made to pay a portion of the expences incurred by allowing early admissions before it should be thrown open to the public.

13. With the foregoing enunciation of his intentions and views, his lordship in Council resolves to call upon the Board of Revenue to issue the necessary instructions to the local officers, and in communication with them arrange the necessary details regarding the local exhibitions for agricultural prizes, and lay before Government at an early date a complete scheme for giving effect to those views.

14. He likewise resolves to appoint the undermentioned gentlemen to form a committee in Madras, at which his lordship will himself preside, who will make generally known the wishes of Government regarding the proposed Exhibition of Arts and Manufactures in the Presidency, and draw up a scheme of all the minor and subsidiary arrangements necessary for carrying out this object:— Honourable J. F. Thomas, Esq.; W. A. Morehead, Esq.; W. U. Arbuthnot, Esq.; Major J. T. Smith; Drs. A. Hunter, E. G. Balfour, H. F. C. Cleghorn, and G. Smith.

15. His lordship in Council desires to take this opportunity of expressing his regret that nothing should have as yet been done under this presidency for acquiring an extensive and practical knowledge of the inexhaustible sources of mineral and vegetable productions of the vast territories under this government.

16. At present a small pecuniary contribution to the Botanical Gardens, which are supported by private subscriptions, comprises all that is done in Madras, whilst an educated horticulturist and garden are supported at Ootacamund.

17. At Calcutta, Bombay, and, it is believed, in the North Western Provinces, and the Punjaub, Botanical Gardens are kept up at the sole expense of Government, and the Governor in Council has no hesitation in stating that a similar establishment ought to be supported here, and that in addition to the Gardens at Madras and in the Neilgherries, with their respective curators and establishments, not less than two able and experienced botanists and mineralogists, of sound practical knowledge and science, should be kept continually moving about the country, in order that a thorough knowledge of the rich and varied productions of Southern India in these important departments of nature might be rapidly acquired and turned to account. This object, it is evident, cannot be accomplished by the amateur exertions of men not fully masters of the science nor practically acquainted with the arts and manufactures of Europe. The views of such men will be as likely to mislead as not, and they will never be received with confidence by capitalists, and will never therefore lead to any practical or successful results. Of the importance of thus bringing Western science and appliances to bear upon the dormant natural resources of the country, and the ultimate benefits which may be expected to accrue from such researches, there can hardly be a doubt, and the Governor in Council therefore trusts that the Honourable the Court of Directors, to whom these views will be communicated, will be pleased to approve of the proposition, and sanction the expense of the employment of competent men from Europe for carrying out the objects indicated.

W. C. MONTGOMERY, Chief Secretary.

INSTITUTION OF CIVIL ENGINEERS.

PREMIUMS, SESSION, 1853-54.

The Council of the Institution of Civil Engineers have awarded the following Premiums:—

A Telford Medal, to Nathaniel Beardmore, M. Inst. C.E., for his "Description of the Navigation and Drainage Works recently executed on the Tidal portion of the River Lee."

2. A Telford Medal, to Andrew Henderson, Assoc. Inst. C.E., for his paper "On the Speed and other properties of Ocean Steamers, and on the Measurement of Ships for Tonnage."

3. A Telford Medal, to John Pigott Smith, Assoc. Inst. C.E., for his paper "On Macadamised Roads for the Streets of Towns."

4. A Telford Medal, to Alfred Charles Hobbs, Assoc. Inst. C.E., for his paper "On the Principles and Construction of Locks."

5. A Telford Medal, to James Yates, M.A. F.R.S., &c. for his paper "On the Means of Attaining to Uniformity in European Measures, Weights, and Coins."

6. A Council Premium of Books, suitably bound and inscribed, to John Thornhill Harrison, M. Inst. C.E., for his paper "On the Drainage of the District South of the Thames."

7. A Council Premium of Books, suitably bound and inscribed, to Daniel Kinnear Clark, Assoc. Inst. C.E., for his "Description of the Deep Sea Fishing Steamer, 'Enterprise,' with Ruthven's Propellor."

8. A Council Premium of Books, suitably bound and inscribed, to James Simpson, Jun., for his paper "On the Prevention of Smoke in Engine and other Furnaces."

9. A Council Premium of Books, suitably bound and inscribed, to William Michael Peniston, M. Inst. C.E., for his paper "On the Casualties of Tunnelling, with Examples."

10. A Council Premium of Books, suitably bound and inscribed, to David Chadwick, Assoc. Inst. C.E., for his paper "On Water Meters.'"

THE IRON INDUSTRY OF THE UNITED STATES.*

The duties of the commission confided to Professor Wilson's charge, comprised those classes having reference to "Raw Materials" and the industries immediately connected with them. To these were added the examination of the machines and implements used in agriculture, and of certain branches of manufacture in which chemical principles were directly involved. The most important of all the mineral industries,—certainly as far as commercial relations with this country are concerned,—is the iron industry, and to this his attention was especially directed.

The distribution of the various metallic minerals in the different States is somewhat irregular, the rarer metals, as gold, being found but in few localities; tin only to a limited extent, in one place; lead and copper, which are found generally associated together, and occurring to a greater or lesser extent in most of the States; while, happily for the country, iron is met with everywhere, in some places forming deposits of enormous magnitude, and in others, compensating for its diminished quantity by the richness of its ores.

The ores found in the States comprise every variety known in Europe, save, perhaps, that of our own country, the "blackband." Those principally used for smelting are the magnetic oxides, the hæmatites, and the clay-carbonates of the coal measures; besides these, the "spathic," or "sparry carbonate," and the "oligist" or specular iron ore are used, but at present only to a limited extent. The magnetic oxides and the hæmatites are dispersed pretty generally throughout the whole extent of the Union, from Maine to Texas, and from the Atlantic seaboard to the States of the far west. The clay carbonates are associated with the coal measures lying west of the Appalachian chain. In general they are not so rich as those in our own country, but when mixed with the hy-

* Abridged from Professor Wilson's Special Report on the New York Industrial Exhibition.

drated hæmatites, which are met with skirting the coal districts, these lean ores are very advantageously worked up. They are also found in considerable deposits on the Atlantic side of the mountain chain, in Philadelphia, Maryland, Virginia, and North Carolina. The spathic ores are not met with to any great extent; they are found in different localities in Connecticut and in Vermont, and when worked in the old method with charcoal and the ordinary cold blast, they furnish iron of first-rate quality. The specular iron ores occur in the New England States, and in New York State to a limited extent; in the more distant States, both of the South and West,—Texas, Arkansas, Missouri, Iowa, and California they are reported to be present in great abundance.

The very general distribution of iron ores throughout the Union, and the abundance of fuel which the natural forests everywhere readily supplied, gave facilities for the manufacture of iron, which in the early days of the industry was carried on in various parts of the States, and in many formed the only sources from which the inhabitants could obtain their scanty supplies. Possessing in common with the other States both of the raw materials,—the ores and the fuel,—the New England States, owing to the advanced education and general commercial energy of her people, led the way in identifying themselves with the new industry, by forming establishments where it was carried out on a more extensive scale. Gradually, however, the existence of mineral fuel in Pennsylvania gave an advantage to that State which soon showed itself by the rapid growth of her iron industry. This continued annually to increase, while the scarcity of fuel in the New England States rendered them less able to meet the increasing demands of the market which they themselves had principally created. In 1830, anthracite coal was successfully used in smelting ores, and when, some few years later, it was shown that the hot blast could be as advantageously applied to anthracite as to other furnaces, this State became at once the great centre of the industry, and speedily assumed the control of the home market. This position she has held up to the present time, and must hold it for some years to come, until the iron-making resources of the States west of the Alleghanies are sufficiently developed to enable them to compete in production with their more advanced neighbours.

These great resources are as yet but very imperfectly known; geological investigations have long ago made known the existence of beds of fuel to a boundless extent, and so disposed as to offer natural facilities for working which cannot be without their results on the industrial uses to which they are applied. With these beds are associated, probably throughout the greater part of their area, beds of ironstone similar to that which we find in the coal measures of our own country. These give to this region a material advantage over that east of the mountain range, where the coal formation is entirely destitute of the ore beds which seem to be so bountifully distributed throughout the great bituminous coal-field on the western side. Thus while the smelting furnace in the one district finds a ready supply of both ore and fuel immediately at hand, the location of the other has to be determined by calculations based upon the comparative cost, and other circumstances attendant upon the transport to the furnace of the two necessary materials, the fuel and the ores.

The manufacture of iron has hitherto distributed itself on the line of the great rivers, which are the natural feeders to the canals by whose medium the produce has been conveyed to the consuming districts. Thus we find the chief seats of the iron manufacture to be:—1. On the Housatonic river traversing the State of Connecticut. The production of this district is limited to charcoal iron, of the best quality, obtained from the hæmatite scattered along the shores of the river. Spathic iron ore has recently been discovered at Roxburg and Munro. The make of this division is consumed chiefly in the immediate district. 2. On the Hudson river, traversing the State of New York, in a line nearly parallel to the former river. On this line a large production of iron by anthracite coal, which is delivered at an average rate of 3 dols 50 cents. per ton, is rapidly springing up. The rich magnetic iron ores (iron 71.79, oxygen 28.21) which are traced for miles along the western sides of Lake Champlain, yielding from 60 to 65 per cent. of metal on the furnace, can be mined and delivered to the coal on the Hudson at an average cost of 3 dols. per ton. On the Hudson there are six large anthracite furnaces, and on Lake Champlain three more; but in the latter district the chief production is with charcoal, the ore being made in a kind of Catalan forge or bloomery. 3. On the Delaware and Lehigh rivers, the former of which separates the State of New Jersey from Pennsylvania, and empties itself into the Atlantic at Cape May; and the latter joins the Delaware at Easton, about 270 miles up. The Lehigh leads straight up to the north-east extremity of the first great anthracite basin, known as the "Schuylkill." Easton is about equidistant from the anthracite coal-field of Pennsylvania and the primitive ore range of New Jersey, while all around there are extensive beds of hæmatite, yielding about 40 per cent. of metal. The Trenton Iron Company at this place have three large furnaces in operation—two with a diameter of 20 feet, and one of 22 feet—giving an average production of from 500 to 600 tons per week. On looking over the returns, which were liberally shown, some extraordinary runs were observable, amounting to upwards of 240 tons per week from the 20 feet furnace, and continuing at that rate for several weeks together. Higher up the river are the works of the Glendon Iron Company, containing four large blast furnaces. Here, in order to economise space in the engine-house, the blowing cylinders are placed immediately over the steam cylinders of the engine, so that the same piston rods, by a reciprocating movement, work the two cylinders at the same time. At Catasanqua the first furnaces in the States for the use of anthracite iron were erected, and Mr. Crane, in the year 1837, here first successfully applied hot blast to anthracite in iron smelting. In all the works visited economy of production was strictly adhered to. The air was heated by the waste gases of the furnaces, and in most cases the whole steam power, whether for driving the blast or for other purposes, was generated in boilers set in the upper part of the furnace, and arranged so that the heated gases played around them. 4. On the Schuylkill river, which runs into the Delaware a short distance below the city of Philadelphia, there are found, throughout the whole length of the valley, large deposits of hæmatite ores; these, however, are not so rich as those of the Lehigh; while the supply of the primitive oxides and carbonaceous ores is very scanty. Upon this river there are 18 blast furnaces using anthracite coal. Besides these, there are several small charcoal furnaces, whose fires are gradually waning away, though they still support the character of the American iron by the very excellent article produced. 5. The Susquehanna, another of the great parallel rivers running from the highlands of the interior down to the ocean, and which debouches, just below Havre-de-Grâce, on the upper extremity of Chesapeake Bay, has along its banks large deposits of iron ores. As it traverses the three large coal-fields, the Shamokin, the Schuylkill, and the Wyoming, and is well supplied with artificial modes of transport, it offers very great advantages in the manufacture of iron. 6. The Potomac, taking its course some 60 or 100 miles south of the Susquehanna, and running into Chesapeake Bay about midway from the ocean, is abundantly supplied with ores, chiefly hæmatites of good quality. Charcoal is the fuel chiefly used, although the increasing means of communication with the Cumberland coal-field, and also with the anthracite basins of the Susquehanna, have given great advantages in the way of fuel to those furnaces placed within reach of the lines of transport. 7. The Ohio, and the Cumberland and Tennessee, are still only partially developed, charcoal as fuel,

and the hæmatite ores, which are found on the outskirts of the great Appalachian coal-field, being the sources from which the principal portion of the iron is now produced. In the upper part of the Ohio, in the Pittsburg district, more progress has been made; the furnaces are being worked with raw bituminous coal, and with the clay carbonates mixed with hæmatites. Limestone is also found in the immediate vicinity. Besides the production of these eight principal iron districts a large quantity is made in widely dispersed localities, with charcoal as fuel, in small blast furnaces, or in the primitive forges or bloomeries. The gross amount of iron produced in the several States of the Union for the year 1850, as given in the Census returns, is 540,755 tons. The number of hands employed is given at 20,298, and the market value of the produce is estimated at 12,489,077 dollars. Taking the present production of pig iron at 800,000 tons, about one-half of it is consumed for castings, and the remaining portion is left to be converted into wrought iron, at a loss in waste, &c., of about one-third. This, for practical purposes, reduces the total or available production about 130,000 tons, and leaves in round numbers 700,000 tons to meet a consumption of not less than 1,200,000 tons. This deficiency must be supplied by the produce of other countries.

The number of establishments for the conversion of pig into wrought iron in the United States is given in the Treasury returns at 422. These establishments have an invested capital of between fourteen and fifteen million dollars, and give direct employment to upwards of 13,000 workmen. The total amount manufactured in the States may be taken at 500,000 tons per annum. In general the wrought-iron works are carried on as a distinct business from the manufacture of pig-iron. The following establishments, however, combine the whole process of smelting and puddling: the Trenton Iron Company, at Easton and Trenton, New Jersey; Fuller and Lord, at Boonton, New Jersey; Reeves, Buck, and Co., Phœnixville, Philadelphia; Reeves, Abbott, and Co., at Safe Harbour, Pennsylvania; the Montour Iron Company, Danville, Pennsylvania; and the Mount Savage Iron Company, Maryland. The principal cause of the separation of the two branches is probably due to inadequacy of capital to carry on both. Rolling mills for plate and bar iron are met with throughout the States in which iron is produced. In Pennsylvania the establishments for the conversion of cast into wrought iron are numerous. At one of the country rolling-mills charcoal blooms were being used, which were first worked up in a puddling furnace, and then tilted; after which they were again heated, and rolled out into plates of the required dimensions. Charcoal boiler plate fetches a higher price, and is always guaranteed by the maker, as, owing sometimes to an imperfect process of reduction in the forge, a small portion of the fuel is left mixed up with the metal, and remains even after it has passed the puddling furnace and the tilt hammer. To detect the flaw in the iron when rolled out requires great care on the part of the foreman, who carefully notices, after it has left the rollers, whether the surface cools equally all over; if any black spots appear, they show that the plate is imperfect and contains cavities in which carbonaceous matter is usually found. The spots are then marked, and the plate laid aside. In the hands of the engineer they again undergo an examination; the practice of the boiler-makers being to rule them off in one-inch squares, and then test each square with the hammer, the expenses attending any unsoundness falling upon the maker.

A process, patented by James Renton in 1851, for making wrought iron direct from the ore, is being carried out upon a commercial scale at Cincinnati, in Ohio, and at Newark, in New Jersey. At the former place the furnace was of a peculiar construction, resembling in shape an ordinary puddling furnace, at the extremity of which a chamber of the following dimensions,—10 feet high by 6 feet broad, and 7 inches wide,—was built up in fire bricks, forming, in fact, a kind of large vertical muffle or retort; this was entirely surrounded on the sides by the flue or chimney of the furnace. When in operation this muffle or retort, is filled with a charge of ore and coal, both finely broken, and carefully mixed up together in the proportion of about 20 to 25 per cent. of coal to 75 to 80 per cent. of ore. The muffle in question held a charge of 12 cwt. The heated gases from the furnace playing round it raise the temperature of its contents sufficiently to induce combustion of the carbonaceous matter, which is carried on slowly at the expense of the oxygen of the ore. When the ore is sufficiently deoxydised, it is discharged from the bottom of the muffle as required into the "welding furnace," where the heat is considerably increased, and the iron is readily worked up into balls, and thence taken to the hammer in the usual way. The iron by this process cannot be said to be puddled, as the ore never melts, but, having first been deoxidised in a close chamber, is simply welded together in what the patentee terms "an ore-welding furnace." He appears to consider that the great merit of the process lies in the use of the closed chamber, in which the iron is perfectly protected from the wasting effect of the flame and gases of the furnace during the process of reduction, which would otherwise, as they always do, oxidize and slag the ores;—the probable reason why all attempts have failed to work the ores in open chambers. The temperature at which the deoxidizing action is carried on is not high enough to cause the iron to combine either with the carbon of the fuel, or with any of the impurities, as silica, phosphorus, &c., which are always found in common cast iron. The balls were drawn from the "welding furnace" for tilting every half-hour, their size depending upon the quality and yield of the ores that were being used. When the works were visited, a moderately rich hæmatite, yielding about 35 per cent. of metal was being used, and the balls weighed about 80 lbs. each. The average yield obtained it was said was 45 per cent., and the weight of the balls 100 lbs.

In the smelting furnaces (anthracite) the practice of economising fuel by the application of the waste gases to raise the temperature of the blast, and also to generate the steam power necessary for the works, is carried out to a far greater extent than with us, and certainly merits a passing acknowledgment.

There is a very important labour-saving machine in general use in most of the rolling mills, in the shape of a "*rotary squeezer*." This is fully as effective and much quicker in its operation than either the old hammer or the lever squeezer, termed the "alligator" in Wales; at the same time by its rotary action it saves the labour of turning the ball during the operation. The machine, though simple in construction, is necessarily made very heavy and strong to withstand the strain while at work. It consists of a fixed circular case in cast iron, with ribbed or fluted sides, surrounding a stout vertical-ribbed roller, and eccentric to it, which is fixed on to a shaft and pinion, by which it is driven at high velocities. The ball is introduced into the "squeezer" at the widest part, and is rapidly carried round under an increasing (eccentric) pressure. The cap or top is made to move vertically, so as by its weight to accomplish the upsetting of the blooms ere they pass round. The invention is due to Mr. Burden, but has been subject to many close imitations, which have quite recently occupied the courts of law in the State of New York. At the Fall River Mills a "rotary squeezer" (Winslow's patent) applies the same principle in a vertical instead of a horizontal direction. In this case a spring hammer is attached at the side, which strikes the ball at the end as it is passed through the squeezer.

The only other point of interest in connexion with this industry is the method of utilising the slags of iron furnaces, which was illustrated by Dr. W. William Smith, of Philadelphia, in the New York Exhibition, in Class XXVII., where a collection of bottles, slabs, bricks, and

other articles, run direct from the reducing furnace, were exhibited. The finish and appearance of the various articles would justify the expectation that the process, if applicable to the slags of coal furnaces generally, would be of great industrial importance. The price was about 4 c. per cubic foot for slabs.*

At present the United States is mainly dependant upon this country for its supply of steel. This circumstance is due entirely to the infancy and the undeveloped condition of its iron industry, inasmuch as the American iron is in itself well adapted for conversion into steel, while in this country we are obliged to import our supply of steel iron from the north of Europe. The consumption of steel in the States has increased largely in the last ten years, and with the returning prosperity of the iron interests we find the establishments for the manufacture of steel increasing likewise. In 1840, the Treasury returns gave the importation of foreign steel at 44,506 cwt., and in 1850, at 127,517 cwt. The manufacture of steel is principally carried on in Pennsylvania; Philadelphia being the seat of the manufacture in the east, and Pittsburg in the west.

TO PRESERVE STEEL GOODS.

The simplest way of preventing the oxidation of polished iron and steel goods is to dust them over with quick-lime. Where the articles are required to be preserved for many months (such as polished steel grates) strips of dry brown paper freely covered with powdered lime are to be wrapped round the bars; or they may be placed in cases, and the interstices filled up with quick-lime. Pianoforte wire and small goods are preserved in the same way.

The *rationale* of the method is this—steel will not oxidise in *dry* air. The presence of quick-lime, from its hygrometric properties, secures dry air, and thus indirectly the lime preserves steel from rust.

SEPTIMUS PIESSE.

N.B.—This is not a new plan, but is the method adopted by the majority of the Birmingham houses.

Smear with Unguentum Hydrarg. Fort. Wipe carefully before using.

This I have never known to fail.

J. H. H. H.

Home Correspondence.

LITERARY AND SCIENTIFIC INSTITUTIONS ACT, 1854.

Lancashire and Cheshire Institutional Association,
Manchester, September 30, 1854.

SIR,—We feel it our duty to reply to the letters which have appeared in your Journal, commenting on our circular addressed to the Directors of Literary and Mechanics' Institutions in Lancashire and Cheshire.

In opening the subject we submit that our letter, copied in the Journal of September 15, and marked No. 2, is a clear and irrefragable proof that up to the 4th of July we cordially acquiesced in the steps taken by the Society of Arts for obtaining a bill for the better government of Literary and Scientific Institutions. We believe that Mr. Foster will in candour admit that, so far as the Lancashire and Cheshire Association has been able, it has at all times been willing to co-operate with and further the views of the Society of Arts.

At the conference held in London, July 4, the meeting, although favourable to the Bill as a whole, was so determined in its opposition to the 27th clause that a deputation was appointed to wait upon Mr. Hutt, M.P., and represent the strong objections taken by the Conference to a clause that gave a power of appeal to a single member, and placed the all but unanimous majority at the discretionary mercy of Charity Commissioners. The opposition of Messrs. Hudson and Hutchings commenced subsequent to these proceedings. They remark here, however, that they assumed at the commencement that the Bill (a draft copy of which had been sent to them) would, after it had been well considered by the Council of the Society of Arts, be submitted to the consideration of the Annual Conference prior to its introduction to the House of Commons. It is admitted here that the Bill came before the Conference, but it is insisted also that it had passed two readings before the House of Commons, and that the chairman of the Council of the Society stated to the Conference that it would pass through committee in the Commons on the evening of the 5th July, the day following the meeting of the Conference. Messrs. Hudson and Hutchings observe that to ask a Conference to consider a proposal already so far on the way to a final consummation was very like an assumption that what the Council in its wisdom had resolved upon, the Conference would, by courtesy, yield its unconditional allegiance to.

The undersigned proceed to a recapitulation of facts connected with the progress of the measure after the Conference had dissolved and the deputation had waited on Mr. Hutt.

An order of the day, printed in the morning newspapers, July 12, announced that the Literary and Scientific Societies Bill stood for the consideration of the House of Commons on the same evening. Between the 5th of July and the date now quoted, no notice whatever had been taken of the Bill, and, as it was essential that some one interested in the welfare of Mechanics' Institutions, should watch the progress of a measure that had already excited the alarm of a conference specially qualified to judge of its tendencies, it was resolved to inquire, by telegraphic communication, addressed to Mr. Hutt, what alterations had been made in the Bill in consequence of the representations made by the deputation from the Society of Arts. To this inquiry Mr. Hutt replied by letter, saying—"The result of the interview between the deputation from the Conference and myself was the adoption on my part of nearly all their recommendations. The Charity Commissioners were retained, with the assent of the deputation, as the body to whom appeals against the bye-laws should be made."

Be it remarked that the conditions under which the Charity Commissioners were to be retained were not given; one thing only was clear, viz., that the power of appeal had been taken from the hands of one member and had been vested in some undefined minority, with the power of invoking the interference of the Charity Commissioners. Simultaneously with this correspondence it appeared from other sources that this power of appeal was to be vested in one-fourth of the members. Now we ask how did this arise? The Conference was emphatic and unanimous in its condemnation of an appeal to Charity Commissioners under any condition whatever. With this impression the deputation waited upon Mr. Hutt, and consequently there could be no misapprehension of the

* SLAG AS A MATERIAL FOR FICTILE PURPOSES.—Some time ago, Mr. Elliott, of Blisworth, made a very satisfactory attempt to establish the manufacture of bricks and tiles from the slag, or refuse cinder, of blast furnaces. Now, we have a further movement towards a similar end, at the hands of Dr. Smith, of Philadelphia, who, with a staff of chemical assistants, is at present engaged in the matter at Merthyr. His experiments have been made with the view of producing bottles, and domestic utensils of various kinds, as well as tiles and paving-flags; and this mode of converting the enormously accumulating cinder of the iron works has been decidedly successful. The new bottles are tougher and more perfect in their annealment than any of the ordinary glass kind; but they are undistinguishable from glass ones in external appearance. Lady Charlotte Guest has adopted the process, and it is believed that not much time will elapse before the transmutation of what has hitherto been a constantly increasing waste mass, will be a commercially valuable fact.—*The Practical Mechanic's Journal* for October.

duty they had undertaken to perform. Mr. Hutt says he "*consented*" to this modified form of an objectionable feature. Two, at least, of the deputation appointed to wait upon him assert that they were not a party to any modification of the evil, but that the entire clause relating to the Charity Commissioners was by mutual consent struck out of the Bill in question. It is very easy for Mr. Hutt, from his retirement at Gibside, to assert that the statements of Messrs. Hudson and Co's. letter are "destitute of foundation." We simply state facts, taken from correspondence with gentlemen of veracity, and as they directly refute the statements of Mr. Hutt, we leave him to arrange the difference with those whose names in support of our assertions have been quoted in the letter that called forth Mr. Foster's animadversions Sept. 15th; at the same time we wish to remark, that that portion of Mr. Hutt's letter referring to the arrangement made between himself and the deputation cannot, unless aided by stronger evidence than he has given, be taken as a refutation of the position assumed in "Hudson and Co's circular." Mr. Hutt states one thing, two of the deputation from the Conference state another; let Mr. Hutt reconcile the conflicting statements by something more logical than a sneer, or more argumentative than the smile he sends greeting from Gibside.

Let us now see how the Bill proceeded after Mr. Hutt had "consented" to what he calls a modified arrangement of the 26th clause. Mr. Hutt's consent did not, as a necessary consequence, carry with it the approval of all parties interested. An opposition was organised sufficiently strong to stop the progress of the Bill, if Mr. Hutt had insisted upon carrying the measure in the form in which he had "consented" to send it through the House of Commons. His letter leaves an impression upon the reader that he had, without a word of dissent, agreed to strike out the "one alteration only," which he says "was made in the Bill on the third reading, without a word of comment." Now we distinctly assert that the impression made by Mr. Hutt's letter is erroneous. Mr. Hutt did not so easily assent to "the one alteration only." That alteration, we wish to say, was the one to which we had then more especially devoted our attention, and was in reality the precise alteration demanded by the Conference in July. We admit that Mr. Hutt may have "privately informed" Mr. Milner Gibson that he "consented to it," but we should have been better satisfied if Mr. Gibson had not been compelled previously to give notice, from his place in Parliament, that on the third reading he should move that the 26th clause be omitted from the Bill.*

What Mr. Hutt had "privately consented" to insert in the Bill July 5th, he seems to have consented "privately" to abandon July 22nd, when influenced by the opposition brought against him. Mr. Hutt has at any rate been very accommodating. On the 24th of July, he again accommodates himself to suit the views of the Lords to whose care he has committed the charge of the measure in the Upper House, and who thought that Mechanics' Institutions could only exist safely under the wholesome influence of a restraining body, exercising their functions by the authority of statute law. Mr. Foster asks how the Board of Trade got appointed to this office? We answer the question by repeating it to Mr. Hutt. How did the Board of Trade get in? All that we know about it is, that the first intimation of the project came to us through Mr. Hutt, and it is for him to say how the Board of Trade came to be invested with a power more despotically centralizing than was ever before exercised by the crown authority over the educational machinery of England.† Mr. Foster says we were assenting parties to the introduction of the Board of Trade as a court of appeal. In all courtesy to Mr. Foster, let us say that he takes a great liberty when he asserts as much, and is guilty of a breach of propriety when he insinuates that the introduction of the Board of Trade "may possibly be traced to those who caused all appeal whatever to be struck out by the House of Commons." Probably Mr. Hutt will "consent" to explain to Mr. Foster how it came to pass that the restrictions objected to by the House of Commons were re-inserted with ten-fold severity by the Lords.

But we ask here whose Bill was this, for the better government of Literary and Scientific Societies? The Council of the Society of Arts claimed it as their own; they got it drawn; they sat in consultation over its respective clauses. They launched it into existence, made capital out of it at the Conference, and then left it to its fate. Mr. Foster knows nothing about its progress afte the Commons had, by their rejection of the Charity Commissioners, given practical value to the suggestion of the meeting July 4th. Mr. Chester is in the same blissful condition; "one of the active members of the Council of the Society," likely enough to learn what was being done, he calmly tells us he knew nothing about it till it had passed the Lords. So we find the official representative of the Society of Arts, and one of the active members of the Council startled at discovering that, although they had gone to sleep, others had been watching over the interests confided to the care of the Central Council of the Society of Arts. Mr. Foster wonders why we did not communicate with the Society of Arts whilst the Bill was passing through Parliament? We answer, that we had something more immediately pressing to attend to. We had to get deputations to London from other Institutions in the North; and, moreover, we hesitated before disturbing the repose of the Council. They had abandoned the bill so thoroughly that the noble lord who took charge of the measure spoke of it as "a bantling without a protector, likely to be lost in the hurry of a closing session;" and told us that the bill had been pressed into his charge by two noble lords, whom he named, high in office in the Board of Trade, and one of them an active official of the Society of Arts, and a member of Committee of Privy Council of Education. When delay was dangerous was it for us to waste time by reminding the Society of Arts that they had wantonly neglected a duty about the performance of which so much noise had been made at the Conference?

We observe in this day's *Journal* that Mr. Chester, after a very candid acknowledgment that he knows nothing about the progress of the Bill, indulges in the insinuation which originated with Mr. Foster, in his letter Sept. 15th. Mr. Chester, who appears to know nothing in one paragraph, wishes to make the world believe he knows everything in the one immediately following. "For this blot we have to thank none but yourselves, &c." Now, if Mr. Chester knows nothing about it, he had better say as little; it is not for us, but for Mr. Hutt, to say how the Board of Trade got in; from him we first heard it intimated, and upon the strength of his announcement we raised an opposition to the Board of Trade as the party to whom appeals were to be made; and as he knows all about it, and Mr. Chester knows nothing, we invite him to explain away the difficulty.

Mr. Chester's letter induces us to remark, by way of explanation, that his first communication, Sept. 11th, was not opened till yesterday; it was on the cover addressed to Dr. Hudson privately, and, therefore, remained unopened. We yesterday answered, by a private reply, the queries Mr. Chester had submitted, informing him that he was not individually pointed at in our circular. We now say that there is nothing in our letter to warrant the assumption taken up by Mr. Foster, September 15th, presumptuously amplified by Mr. Buckmaster, Sept. 22nd, and acted upon by Mr. Chester in his letter dated Sept. 27th. In our circular we spoke of the Society of Arts and the Privy Council of Education; and Mr. Chester says that as he is "the only person both in the office of the Committee of Council of Education and a member of the governing body of the Society of Arts," he concludes that he is the person pointed at in the paragraph. If Mr.

* Mr. Milner Gibson's letters, dated July 19th and 22nd.

† Vide Appendix.

Chester will look over the list of his colleagues, he will find that he has been somewhat premature in his conclusions.

Our admiration of Mr. Chester's zeal for the welfare of Mechanics' Institutions is not second to Mr. Buckmaster, ut we think that, if Mr. Chester will inquire, he will find his statement incorrect that the original clause would "transfer the appeal from the Court of Chancery to the Commissioners." The powers of the Charity Commissioners, we are informed, on very high authority, could have no such effect.

One word personally important to ourselves. We beg to say to Mr. Foster that our letter to the Institutions in the Lancashire and Cheshire Union was not intended as the self-glorifying medium he supposes it to be. We represented in London the interests and opinions of fifty Mechanics' Institutes, and at the end of our labours we were bound to give an account of their results to the 10,000 members on whose behalf we acted. The circular was prepared originally for our own district; we felt it to be important to place before our friends the facts, as far as we had them; there was no self-laudation intended; and, as far as the Society of Arts is concerned, we think that what the Council did, and what it left undone, in this question are as important subjects for the consideration of members of Mechanics' Institutions as any that can be brought before them.

We are happy to acknowledge that in our efforts to obtain amendments in the Literary and Scientific Institutions Bill we have been ably assisted by the attendance in London of Mr. James Hole and Mr. Edward Baines, representing the Yorkshire Union; Rev. Henry Halford Jones, F.R.A.S., representing the Manchester Athenæum, and Mr. Robert Rumney, representing the Manchester Mechanics' Institution.

In conclusion we repeat that the thanks of Directors of Literary and Mechanics' Institutions are due to the Rt. Hon. Thomas Milner Gibson, M.P., Lord Stanley, M.P., Mr. John Bright, M.P., Lord Goderich, M.P., Mr. G. Hadfield, M.P., Rt. Hon. M. T. Baines, M.P., Mr. Layard, M.P., Mr. Barnes, M.P., and to Lord Monteagle; for we reiterate the fact, that but for the influence exercised by these gentlemen, the Bill would have passed as an enactment taking the chief powers of management of Institutions from all Directors and Committees, and at the same time preventing Institutions from extending their operations without *first* asking the Board of Trade for its sanction. We are sir, &c.,

J. W. HUDSON, Ph. D.
E. HUTCHINGS.

APPENDIX.

We extract the following from the 27th clause of the bill ordered to be printed by the Lords, July 31st, 1854, and we offer it as a proof that we have not overstated our case, so far as the centralising restrictions of this unjust measure are concerned:—

"Provided always that no proposition for any variation of the purposes for which an Institution is established, or for any amalgamation thereof with any other Institution or Institutions, shall be submitted to any such meeting (*i.e.*, a general meeting of the members), unless the same shall have been approved of by the Lords of the Committee of her Majesty's Privy Council for Trade and Foreign Plantations, such approval to be signified in writing, under the hand of one of the secretaries of the Lords of the Land Committee."

It was this clause that we, in London, successfully opposed. Mr. Chester says that we did no more in the Commons than cause the power of appealing to the Charity Commissioners to be struck out of the bill on the third reading. Good! we did no more than that in the Commons; and that was all the Conference desired; we did, however, what Mr. Chester and the Society of Arts failed to do—we realised the unanimous wish of the meeting in July. Mr. Chester goes further. He insinuates that we did no more in the Lords than consent to an appeal to the Board of Trade. Let anyone read the Act as it received the royal assent, and then tell us whether we have not done more than Mr. Chester gives us credit for.

J. W. HUDSON, Ph. D.
E. HUTCHINGS.

On this subject, Mr. Chester has requested us to publish the following reply to his letter, which appeared in last week's Journal.

Institutional Association, of 60 Literary and Mechanics' Institutions in Lancashire and Cheshire.
Manchester, 28th September, 1854.

Dear Sir,—Your favour of the 11th inst., sent to the private address of Dr. Hudson, was opened this morning on his arrival from the Continent. We have no hesitation in stating that the passage quoted by you from our Circular of 6th inst., is not intended to refer to you, but especially to two noble Lords, members of the Committee of Privy Council* and Board of Trade, who induced Lord Monteagle to take charge of the Bill for them in its passage through the House of Lords. From our reply to Mr. P. Le Neve Foster, which we hope to see in *next* week's Journal of the Society of Arts, you will be placed in possession of some facts upon this subject.

We are, dear Sir,
Yours respectfully,
J. W. HUDSON, Ph. D.
E. HUTCHINGS.

MR. THWAITES'S CYPHER.

Sir,—Mr. Thwaites rests the value of his *inscrutable* cypher on the impossibility of finding its key, even when both the cypher and its translation are given. He quotes a passage from "The Tempest," and gives the same in cypher. The best answer is at once to print the master-key of that cypher.

Remainder.	Tabular Number	Remainder.	Tabular Number
0	24	12	22
1	2	13	8
2	17	14	16
3	7	15	25
4	1	16	3
5	11	17	5
6	8	18	9
7	4	19	12
8	6	20	4
9	23	21	3
10	14	22	13
11	15	23	7

To interpret any character in the cypher:—

Count its number from the beginning. Divide this number by 24, and take the remainder. Opposite that remainder in the annexed table is found a Tabular number.

Subtract the Tabular number from the number expressing the place of the cypher in the natural alphabet. This last remainder will then express in that alphabet the place of the letter, which is the translation of the given cypher character; when this difference is negative, add twenty-six to it.

Thus—take the word "thou" (represented in the cypher by *gomw* and *hwkc*) which occurs twice in the fifth line.

g is the 142nd character. 142=5×24+22 opposite this remainder 22 is the Tabular number 13.

* The words "of Education" were originally written but struck out before the letter was received by me.—H. C.

The cypher *g* is the 7th letter in the natural alphabet.
Then . . . 7 = place of cypher in the alphabet.
Subtract . . 13 = Tabular number.

Last remainder— 6
Add . . . 26

20 the 20th letter of the alphabet is *t*.

The cypher *o* (the 15th letter of the alphabet) is the 143rd character. $143=5\times24+23$. The remainder 23 gives the Tabular number 7.
Then . . . 15 = place of cypher in the alphabet.
Subtract . . 7 = Tabular number.

8 the 8th letter of the alphabet is *h*.

The cypher *m* (the 13th letter) is the 144th character. $144=5\times24+0$. Remainder is zero, which gives the Tabular number 24.
13 = place of cypher.
Subtract . . 24 = Tabular number.

— 11
Add . . . 26

15 15th letter of the alphabet is *o*.

The cypher *w* (the 23rd letter) is the 145th character. $145=6\times24+1$. Remainder = 1, which gives Tabular number 2.
Then . . . 23 = place of cypher.
Subtract . . 2 = Tabular number.

21 the 21st letter of the alphabet is *u*.

In the word *hwkc*,
Cypher *h* (8th letter) is the 154th character. Remainder = 10, which gives Tabular number 14.
8 = place of cypher.
14 = Tabular number.

— 6
Add . . . 26

20 20th letter of the alphabet is *t*.

Cypher *w* (23rd letter) is the 155th character. $155=6\times24+11$. Remainder = 11, which gives Tabular number 15.
Then . . . 23 = place of cypher.
15 = Tabular number.

8 8th letter of the alphabet is *h*.

Cypher *k* (11th letter) is the 156th character. $156=6\times24+12$. Remainder = 12, gives Tabular number 22.
Then . . . 11 = place of cypher.
22 = Tabular number.

— 11
26

15 15th letter of the alphabet is *o*.

Cypher *c* (3rd letter) is the 157th character. $157=6\times24+13$. Remainder = 13, gives Tabular number 8.
3 = place of cypher.
8 = Tabular number.

— 5
Add . . . 26

21 21st letter of alphabet is *u*.

Mr. Thwaites seems not aware of the principles on which such cyphers are constructed, for he appears to have employed two cyphers in succession, viz., the word TWO against *p*, and COMBINED against *e*.

The first is a common cypher of three alphabets, recurring at equal intervals, indicated by the word TWO. The words LOG or RUM would do equally well. The cypher thus arrived at is then translated into another cypher of the same kind, having eight alphabets, and indicated by the word COMBINED against *e*.

It seems to have escaped Mr. Thwaites's notice, that the several successive translations add nothing to the security but much to the labour of his cypher. He will find below the first line of his quotation translated into those two cyphers, and will perceive that the order in which they are made does not alter the result:—

Soft, Sir, one word more by TWO against *p*
wvex zhv vmi dnvk lsyd by COMBINED against *e*
ufmu dqv uks lkzt lrwn

Soft, Sir, one word more by COMBINED against *e*
qynq wrr nlo elvm mnpo by TWO against *p*
ufmu dqv uks lkzt lrwn

The same result will be given by the master-key above with one translation. The second letter T in Mr. Thwaites's cypher is a mistake; it should be F.

Mr. Thwaites strongly protests against the received rules amongst decypherers, viz., that no one has the privilege of proposing a challenge cypher except he is himself known to have deciphered a difficult cypher.

This rule is founded on common sense, and is admitted, because it is perfectly well known that it requires a very small exertion of intellect to contrive a very difficult cypher. But to contrive a very difficult cypher, which is also very easily written and as easily translated, requires an understanding which has mastered all the principles of deciphering. Having accepted Mr. Thwaites's challenge, and having sent you the solution, I am now in a position to call on Mr. Thwaites to try a cypher of my own. I shall, however, at present content myself with asking him to do what I have already done for him, namely, from the same passage of Shakspeare, cyphered according to his *own law*, to discover my key.

Jcxc wii hdx ivow lquq nnka wes vmge fx wadgzjh oxqhow ugp svrg vwmfi hrzqdmjj a sfwp reclcz znfe cqkx dwın ınekrg xfxxald xkrh mxh itpvw ugtzy ybc ruig cgzt fsdxtcv wlxm kkng xquq sdlisp ci gexs tsaq iwmh pedon zraa focv gqxdrs xu q cab ry lsx hw fkqp zz gnh lyrh wjk.

I have the honour to be, &c.,

C.

October 2, 1854.

P.S. In my last note, printed in your issue 1st September, there is a curious mistake. The sentence there appears thus:—"I have also invented alphabets. It should be, "I have also inverted alphabets."

CHARCOAL RESPIRATORS.

Sir,—As many persons object to the unsightliness of the ori-nasal charcoal respirator, I have recently got one constructed for the mouth alone. It does not differ in appearance from an ordinary respirator, but is only half its weight. The air is made to pass through a quarter of an inch of coarsely-powdered charcoal, by means of which its temperature is greatly increased. This charcoal respirator possesses several advantages over the respirators ordinarily in use. 1st. Where the breath is at all fetid, which is usually the case in diseases of the chest, under many forms of dyspepsia, &c., the disagreeable effluvia are absorbed by the charcoal, so that comparatively pure air alone is inspired. This, I think, may occasionally exercise a beneficial influence upon diseases of the throat and lungs. 2ndly. The charcoal respirator for the mouth alone will certainly prove highly useful in poisonous atmospheres where miasmata abound, if the simple precaution is only observed of *inspiring* the air *by the mouth and expressing it by the nostrils*. The charcoal respirator for the mouth is much cheaper than any other effective form of the ordinary respirator, being manufactured by W. B. Roof, 8, Willow-walk, Kentish-town, for not more than 4s. each.

Yours very truly,
JOHN STENHOUSE.

St. Bartholomew's Hospital, 30th September, 1854.

Proceedings of Institutions.

GUERNSEY.—The rules of the Mechanics' Institution and Literary Society have just been revised. It may be useful to call attention to articles 15 and 16, respecting "Visitors." They are as follows. "15. Visitors not resident in the Island shall be allowed the use of the Reading-room gratis, for one fortnight, on recommendation of a member of six months' standing, who shall enter the name of such visitor with his own in the book kept for that purpose. 16. Members of the London Society of Arts or of any Mechanics' Institution or Literary Society in the United Kingdom of Great Britain and Ireland, producing the receipt of such Institution, shall be entitled to attend the room of this Institution and all gratuitous lectures until the time such current receipt shall have expired."

Miscellanea.

IMPROVEMENTS IN THE MANUFACTURE OF STEEL.—The attention of scientific men and manufacturers has latterly been seriously directed to the application of electricity in the treatment of ores and metals; but, up to the present moment, Mr. Adrian Chenot is the only man whose perseverance and talents have given practical proof of its commercial advantages in the manufacture of steel. Mr. Chenot employs,—Firstly, an electro sorting-machine, to separate the crushed ore, and to raise it to its maximum standard of pureness and richness, qualities which the steel subsequently retains. Secondly, a system of cementation, or addition of carbon and other matters by cold process, in such a way that this delicate operation can be repeatedly effected in well-determined and exact proportions, which results in the production of steel as varied in quality as can be desired, capable of being reproduced with certainty, and of identically the same temper and quality. Thirdly, a compression of the ore, after its transformation, and before or after cementation, into a sponge. Although this is simply mechanical, it is productive of considerable advantages: 1. The ore reduced into a sponge was so liable to be affected by fire or humidity, that it could not be preserved before it was compressed. 2. In consequence of the great reduction in volume of the compressed sponge, it is worked with an economy of 50 per cent. in fuel and manual labour, in welding, melting, &c. Double the wear can, it is stated, be got out of tools manufactured from steel of this compressed sponge, as compared with the tools made from good steel of Sheffield marks; and Mr. Chenot is willing that any party treating for his patent for the United Kingdom should send his own ore, and even his own fuel, if he desired, in order that he may have the following advantages clearly demonstrated to him: 1. The manufacture of steel in ten days, which has hitherto required forty. 2. The possibility of reproducing the exact quality of steel desired. 3. The cost-price of the steel not to exceed one-third of the present price, relative qualities being borne in mind.

To Correspondents.

In the list of Institutions in Union published in the Supplement to the last number of the Journal, asterisks should have been attached to

Bramley, Mechanics' Institute

Poole, Mechanics' Institute

to indicate that they have agreed to a General Interchange of Privileges.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Sept. 29th*, 1854.]

Dated 31st August, 1854.

1909. G. Eden, Norwood—Cooking utensils.

Dated 6th September, 1854.

1945. J. Eden, Lytham—Drying fabrics.

Dated 7th September, 1854.

1949. E. Calvert and W. Mitchell, Walton le Dale—Looms.
1951. P. A. Garnaud, Paris—Gazogene apparatus.
1953. H. Lund, Temple—Propelling and steering vessels.

Dated 8th September, 1854.

1955. J. T. Manifold and C. S. Lowndes, Liverpool—Windlass fittings.
1957. J. Youil, Burton upon Trent—Fermenting liquors.
1963. W. P. Sharp and W. Welld, Manchester—Silk.
1965. J. Atherton, J. Kinlock, and J. Swainson, jun., Preston—Dressing yarns.
1969. H. R. Ramsbotham and W. Brown, Bradford—Preparing fibrous materials for spinning.

Dated 9th September, 1854.

1971. J. W. Hackworth, Darlington—Steam engines.
1973. T. Hodson, Manchester—Doubling yarn.

Dated 11th September, 1854.

1975. P. R. Jackson, Salford—Wheels.
1977. E. Palmer, Southampton—Propelling vessels.
1979. J. Worrall, jun., Salford—Fustian fabrics.
1981. J. C. Purnelle, Tachbrook street, Pimlico—Motive power.

Dated 12th September, 1854.

1983. E. Gillman, Twickenham—Obtaining filaments from various vegetable substances, &c.
1985. C. W. Forbes, Bartley, Hants—Rest for fire-arms.
1987. J. Williams, Liverpool—Propellers.

Dated 14th September, 1854.

1996. C. F. Stansbury, 17, Cornhill—Screws. (A communication.)
1998. C. F. Stansbury, 17, Cornhill—Punches and dies. (A communication.)
2000. R. Adams, King William street, City—Boring and rifling barrels of fire-arms.
2002. J. Bernard, Club chambers, Regent street—Boots and shoes.
2004. R. Rawlinson, Westminster—Valves or adjustable thoroughfares.

Dated 15th September, 1854.

2006. F. Fontenau, Paris.—Preventing mud from adhering to carriages.
2008. A. Barclay, Kilmarnock—Refracting and reflecting telescopes.

Dated 16th September, 1854.

2010. J. Harrison, J. Oddie, J. Eaves, and H. Graham, Blackburn—Preparing yarns for weaving.

WEEKLY LIST OF PATENTS SEALED.

Sealed September 29th, 1854.

773. Capt. Henry Young Darracott Scott, R.E., Queen's terrace, Woolwich—Improved mode of manufacturing cement.
1021. Charles Cammell, Cyclops Steel Works, Sheffield—Improvements in buffer, draw, and bearing springs for railway carriages, and in the mode of or apparatus for making the same.
7. Charles Payne, Belmont place, Vauxhall—Improvements in salting animal matters Extension, for five years from 14th Oct. 1854.

Sealed October 3rd, 1854.

758. James Forsyth, Caldbeck, Cumberland—Improvements in machinery for preparing and spinning wool and other fibrous substances.
794. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn—Improvements in sewing machines.
834. Henry Gilbee, 4, South street, Finsbury—Improvements in the construction of axle boxes and axle bearings.
1248. Edward Maniere, Bedford row—Improvements in getting peat, and in manufacturing peat with other matters into fuel.
1260. William Edward Newton, 66, Chancery lane—Improved manufacture of bonnets and other coverings for the head.
1412. Andrew Smith, Princes street—Improvements in the manufacture of certain kinds or descriptions of wire and other ropes and strands.
1602. Alfred Vincent Newton, 66, Chancery lane—Improved construction of metallic spring.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Sept. 26.	3640	Button	Rogers and Whateley	Warstone lane, Birmingham.
29.	3641	Shirt	John Edward Smith	26, Wood street, Cheapside.
29.	3642	Walking Boot	H. Marshall	The Green, Northampton.
30.	3643	The Alarm Signal Walking Stick	Leopold Cohen	37, Newhall street, Birmingham.
Oct. 4.	3644	Double Lipped Sewer or Drain Trap, with Double Grating	Henry Rogers	43, Upper Thames street.

Journal of the Society of Arts.

FRIDAY, OCTOBER 13, 1854.

MEETING OF COUNCIL.

Monday, 9th October, 1854.

The following Institutions were taken into Union:—

370. Bridgnorth, Mechanics' Institution.
371. Bucks and Berks, Lecturers' Association.
372. Downham Market, Mechanics' Institute.
373. Oxford, Public Library.

EDUCATIONAL EXHIBITION.

The Council have great pleasure in announcing that they have received a communication from the Secretary to the Treasury, stating that their Lordships "have decided that it will be desirable" to establish a Permanent Educational Museum. The nucleus has been already contributed by a large proportion of the Exhibitors at the recent Exhibition at St. Martin's Hall.

The Council congratulate the members on this important result. It is right, however, that they should be reminded, that it has not been attained without involving the Society in considerable expenditure beyond the receipts at the doors and the amount of the special subscriptions. It is hoped that the deficit may be met by further voluntary subscriptions, without trenching on the ordinary income of the Society.

REPORT OF COMMITTEE ON WORKS OF ART.

Your Committee to whom was referred the duty of examining "the Engravings, Drawings, and other Works of Art in the Educational Exhibition, and to report to the Council thereon, not omitting to point out such works as, in their judgment, may be really worthy of special commendation in the first, second, and third degree of merit," have the honour to report that they have examined the specimens referred to in the Educational Exhibition at St. Martin's Hall, with a view to the objects of the inquiry committed to them.

Countries Exhibiting.

They found that various works, coming under the description above defined, have been contributed from America, Austria, Belgium, Denmark, France, Holland, India, Prussia, Spain, and Switzerland. The English contributions in this class have, with few exceptions, been sent from schools in the metropolis or its neighbourhood.

Your Committee have to regret that no contributions of importance, in this department, have been received from Berlin, as they are aware that a judicious system of instruction had been introduced into the principal industrial school in that capital through the exertions of the late Geheimrath Beuth. Your Committee would recommend that application should be made, if not for examples of the labours of the scholars, at least for such of the elementary books, with descriptions of the regulations and methods of instruction, as may be calculated to convey information respecting the general system of the Berlin school. The useful work known under the title of "Vorbilder für Gewerbschulen," if not already known in this country, should, if possible, be procured.

Your Committee are not aware that any contributions relating to the arts of design have been received from Italy. This is also to be regretted, as the methods of instruction in some of the Italian schools for drawing might be found worthy of notice. A member of your Committee has pointed out the circumstance that in the present drawing academy in Venice, the students, after having completed the copying of an object, are required to draw the same object again entirely from memory. The utility of such a system, in promoting a knowledge of form together with facility of hand, is proved by experience.

Nature and Comparative Merit of Specimens.

The specimens consist chiefly of engravings, drawings, and models, together with mechanical contrivances to assist the practice of drawing and books of instruction, and of examples for the same purpose. Many exhibitors, both foreign and English, have included specimens of art only so far as such productions have been employed as auxiliaries in general education. These consist for the most part of engravings, from such as are intended to convey the most elementary instruction to works having an elevated aim as illustrations. Among the first may be noticed pictorial aids for the study of the rudiments of natural history, and more particularly of animals. Prints of this kind are published under the direction of the Christian Knowledge Society, by Trentsensky of Vienna, Varty and Co., Darton and Co., and others. Some of these represent the animals in relative proportion to each other and to man, the human scale being in some cases expressed. The object of another series is to explain pictorially the uses of certain animals to man. In these engravings, contributed by Varty and Co., the animal is exhibited in the centre, while the illustrations of its uses occupy the surrounding compartments.

Among the anatomical works, the lithographs relating to comparative anatomy, by Mr. Waterhouse Hawkins, (Darton and Co.) deserve notice. It is to be remarked, however, that the dark "filling in" between the outline of the skeleton and that of the external conformation, has the effect of confusing the appearance; it is suggested that the same end might be attained with more distinctness by a mere outline of the external form. Of the knowledge of structure exhibited in these representations there can be no doubt; it is, therefore, the more desirable that a certain want of precision, either in the execution or from the imperfect printing of the lithographs, should be corrected. The useful works which exhibit the anatomy of the antique statues, whether included in the present Exhibition or not, are too well-known to require particular notice.

Publications relating more strictly to natural history, including botanical works, are to be regarded as purely scientific. The engravings of trees, with a view to teach their distinctive appearances, are, from the nature of the undertaking, rarely successful. In general they can neither be said to be scientific nor picturesque. It is recommended that, in order to secure some positive utility on the scientific side, they should be accompanied by the botanical details of the leaves, flowers, and fruit; while, as regards artistic requisites, it would be rather advisable to give a portrait of a well-selected specimen than to aim at a generic type. Your Committee would observe generally, that in all representations intended to convey information that purpose should be considered of paramount importance, especially as the exhibition even of general characteristics is more likely to be picturesque when a well selected example is accurately imitated. This latter system is adopted to a certain extent in some elementary books on landscape drawing. The reverse of this is a routine picture-making, unredeemed by the evidence of truth either in the whole appearance or in details, and from this defect some of the prints intended for educational purposes are not exempt.

Among representations in which art is subservient

to the purpose of conveying information may be mentioned the pictorial department of the *Illustrated London News*. Two specimens are exhibited,—a panoramic view of the Great Exhibition of 1851, and a panoramic birds-eye view of London. In such subjects a great degree of accuracy is attainable. In representations of ephemeral scenes an approximation only to truth can be expected; but so much of the visible character of passing realities is thus preserved that the future importance of such a publication can hardly be over-estimated, more especially while the artists employed, however eminent, do not disdain the essential requisite of fidelity.

In the illustration of past events—whether derived from the pages of modern history or from the records of antiquity—the interest must, in most cases, depend rather on artistic merits than on absolute truth of representation; for even when all possible accuracy in topography, costume, and accessories is attained, some of the greatest difficulties of art—invention, clearness in telling the story, action and expression—remain to test the powers of the designer. Such illustrations have accordingly always been considered to belong rather to poetic than to strictly historic art. There are several works of the kind in the Exhibition which merit commendation; those, for instance, by Messrs. Herring and Remington. But by far the best undertaking of this description, combining the requisites of great merit and extraordinary cheapness, are the Bible Illustrations designed by Professor Schnorr, of Dresden, and contributed to the Exhibition by Messrs. Williams and Norgate. These designs are not only well adapted illustrations in connexion with general education, but are eligible as examples of some of the prominent qualities of pictorial representation,—their importance in this latter view is considerable. In many arts, for example in glass-painting, it is not expected that the artist shall be always original; a reference to good examples calculated to assist his invention and improve his execution, has, in such cases, always been permitted and encouraged. Hence such specimens of composition, drapery, and drawing as the designs referred to present, must be regarded as valuable auxiliaries, and as tending to form a good taste.

The last-named works are not coloured. Other examples of the kind are coloured; and it must be acknowledged with regard to such latter works generally, that the inharmonious violence of the tints appears to increase with the feebleness of the design. It might be supposed that engravings coloured by hand must generally be superior in their effect to such as are coloured by processes analogous to printing; yet, judging from the examples in the present Exhibition, the contrary is the result. The beautiful specimens of typochromatic printing contributed by Messrs. Rowney, are by far the most tastefully and harmoniously coloured works in the Exhibition. These prints reproduce with surprising fidelity the best water-colour drawings.

The popular field of topographic illustration has been enriched of late years by publications combining scriptural history with views of scenes, architectural remains, and other objects, often tending to throw important light on the narrative itself. The illustrated "Life and Epistles of St. Paul," by Conybeare and Howson, contributed by Messrs. Longman, may be cited as an example.

Various other works might be noticed as possessing interest from the circumstances under which they are exhibited; such as the drawings, including some good drawings of plants sent from the Manchester School for the Deaf and Dumb. Such schools, being in general more remarkable in other branches of education, will more fitly come under the notice of other Committees.

In first examining the general nature of the works contributed, your Committee remarked that few Institutions for the study of design in its higher branches have sent specimens. Some few foreign examples of the kind cannot be cited as very remarkable. On the other hand, some establishments in this country and in France, while professing only to impart that knowledge and practice of design which can be useful in the industrial arts, have promoted the cultivation of drawing to an extent which might do honour to academies for the study of the Fine Arts. Your Committee allude more particularly to the contributions from Paris. Various works produced under the direction of the Department of Art at Marlborough House might be placed in the same class; with regard to the latter it is, however, to be observed, that the specimens sent to this Exhibition appear to have been selected rather with a view to show the methods and varieties of art-instruction sanctioned by the department, than to exhibit the proficiency of the students. Your Committee make this observation on sufficient grounds, being well acquainted with what the department has produced, and being quite prepared to say that, had the object been to exhibit the attainments of the students as well as the nature of their studies, the result might have placed this portion of the Exhibition in a still higher position than it now holds. As it is, judging of submitted specimens only, the palm is due to the Ecole Municipale at Paris, directed by M. Lequien.

There are various contributions from other French schools of the kind, but, with the present means of judging, those referred to appear to be the most successful. So satisfactory a result induces a wish to be acquainted with the methods of instruction; on this point, however, the materials are scanty. The communications from M. Lequien contain a few general regulations and a notice of the description of artizans who frequent the school, or for whom it is intended, but the system of teaching can only be gathered from the examples exhibited. Among those for whom the school is intended, and who, it seems, attend in the evening, are mentioned bronze chasers, designers for paper-hangings, designers for textile fabrics, porcelain painters, wood-carvers for furniture, sculptors for buildings, engravers, jewellers, lithographers, decorative painters, called also "peintres d'attributs," &c. The age at which students are admitted is 12. This appears to be a more judicious regulation than that adopted in some other Continental schools. Among the contributions from the Ecoles Communales at Brussels, and other parts of Belgium, are some drawings of architectural foliage, from the inscriptions on which it appears that the students began at the age of seven. It must be confessed that, judging from the specimens, the progress, after several years, is not remarkable.

Methods and Materials.

The directors of schools for drawing appear to be agreed on the expediency of teaching the beginner first to copy simple forms from a flat surface, then to copy from inanimate objects in relief, and lastly to copy from the life. In the short statement of M. Lequien above quoted, this view is also expressed. Much, however, depends on the time allotted to each stage. In general the system of copying from the flat—that is either from drawings or from engravings—is carried much too far. The specimens sent from some schools consist of little more than indifferently executed copies from indifferent engravings, the subjects being frequently formless and altogether ill adapted for such a purpose. But for the very general prevalence of this system, not only at homes but in some industrial schools abroad, your Committee would hardly have thought it necessary to point out the bad tendency of such a practice. In better conducted schools, the copying from the flat is limited to the acquisition of a due flexibility of hand, and what may be called elementary habits, analogous to those formed in the first lessons in writing. But the exercise of the eye cannot be too early taught by the observation and comparison of the forms of simple, real objects. In this practice again the ingenuity of teachers, as exemplified in the present Exhibition, appears to be sometimes too refined. The best authorities agree in recommending that simple, geometrical solids should be first placed before the beginner, and when a certain power of seeing and imitating them is acquired,

he will feel a satisfaction in copying any ordinary objects that have some analogy with the forms which he has previously learnt to copy. Such real objects, if not too complicated, are preferable to elaborate toys, representing ivy-grown cottages and towers, such as are sometimes constructed as aids for teaching drawing. Any artificial varieties from the plain geometrical solids should be of the simplest description, since natural objects of the requisite size, equally applicable and more interesting to the student, because they are real, can be readily found. Among some useful contrivances, specimens of which have been sent from Marlborough House, may be mentioned some skeleton squares, circles, and cubes made of metal rods or tubes. These, placed in different views, are calculated to familiarise the eye with perspective appearances, and to render the study of perspective itself more intelligible.

The elementary books, also from Marlborough House, on the practice of drawing, together with those containing examples of ornament, appear to have been adopted on good grounds. Some of the examples of ornament that are exhibited, consisting of flowers and foliage printed in colours, are not, however, agreeable specimens of this process.

With regard to the execution of chalk drawings, your Committee noticed that the industrial schools generally, and especially those of France, appear to encourage the use of the stump in shading. When the purposes of such schools, and the general description of the students are considered, there seem to be good grounds for this practice. A readiness in handling the port-crayon, so as to imitate the masses and gradations of shade without apparent labour, is not soon acquired, and even when acquired, may be rather specious than really the result of intelligence. It is surely enough that artisans should draw with correctness, and imitate faithfully the appearances of light and shade, without requiring from them the questionable dexterity of rapidly executing shadows with the point. The use of the stump, aided more or less by the point, may answer all the end, and, in saving the student's time, may have the effect of directing his attention more exclusively to the essential object proposed.

But if this method is advisable in such establishments, and for such students as those now referred to, it does not follow that in schools where the most intimate acquaintance with anatomy is promoted, and the higher objects of art are contemplated, a different system should not be followed. The finer delicacies of marking, the utmost intelligence in rendering structural details, and the nice expression of surface, are better expressed with the point, provided a due lightness and freedom in its management have been acquired; added to which, such execution, when truly skilful and significant, is a fit preparation for the exercise of the brush. From a passage in Crespi's continuation, or third volume, of Malvasia's "Felsina Pittrice," p. 299, it appears that the stump was introduced late among the Italian draughtsmen. Crespi does not hesitate to condemn its use and tendency. It would follow that the soft gradations in some drawings by the great painters—for example, Correggio—may have been produced by partial rubbing with the finger, or by similar means; the stump or *sfumino* itself having been probably unknown to the earlier masters.

Applications of Art.

The applications of art to the purposes of science and of general education have been already adverted to. Perhaps the applications to industrial purposes were not considered to come within the scope of the present Exhibition. Some conclusions may, however, be drawn from the nature of the examples or prototypes generally in use. Your Committee are led to remark that the system of drawing from classic forms of foliage, as an introduction to the study of ornamental design, may perhaps be too exclusively inculcated. It is remarkable how universal the habit has become—not only in Europe, but wherever the study of design is cultivated in accordance with European habits—of imitating the elegant but restricted forms of Greek foliage. The same system is followed in India; and your Committee, while entertaining the highest opinion of the zeal and ability of a prominent contributor in promoting the interest of the Industrial School at Madras, would suggest, with reference to that establishment, that when the requisite facility of hand in drawing or in modelling has been acquired by native students, it would be desirable to direct their attention to the best examples of Oriental ornament; so that, instead of reproducing the forms of classic antiquity, they might be led to combine and improve upon the types presented by the decorative portions of their own architecture and costume.

The copying from Greek foliage is, like many other questions with which art-teachers have to deal, a question of degree. In judicious measure none will disapprove of the use of such materials, but the highest use which can be made of those examples is to lead the student to adapt the forms of natural leaves and flowers, on similar principles, to the purposes of decorative art generally. The widest scope for this kind of invention is opened in the department of ornamented textile and other fabrics, and the course of study, with this view, which is adopted under the direction of the art-superintendent at Marlborough House, promises to be eminently successful.

Your Committee have not overlooked the request of the Council that they would point out such works as, in their judgment, may be worthy of commendation in the first, second, or third degree of merit. They conceive, however, that the selections which they have made may suffice, while the general observations that have been offered are to be understood to be applicable to other works that have not been particularised.

C. L. EASTLAKE.
F. S. CARY.

St. Martin's Hall, August 9, 1854.

REPORT OF COMMITTEE ON MUSICAL INSTRUMENTS.

In accordance with the wishes of the Council, I beg to state that, in conjunction with Mr. Sterndale Bennett and Mr. Hullah, I made an examination of the musical instruments at the Educational Exhibition, St. Martin's Hall. And having been requested to act as reporter I have the honour to forward the following report:—

The Exhibition of musical instruments was of a very limited character, comprising principally harmoniums, accordions, concertinas, and instruments of that kind, all useful in themselves, and well adapted for those who may wish to gratify a taste for the art, without being compelled to devote a life-long labour to the task.

The harmonium is an instrument which, in the absence of the stately organ, is a valuable adjunct in parochial psalmody; and the sacred edifice which cannot afford the more magnificent instrument, may at least find a useful though humble substitute in the harmonium. It may therefore be considered, from its cheapness of price in comparison with the organ, an acquisition in contributing to render the psalmody in the service of the church more attractive than it can be when left solely to the unassisted voices of the multitude. There were but two of these instruments in the Exhibition, neither demanding any special remark.

The concertinas and accordions, being modifications of the same class as the harmonium, but on a very much smaller scale, can only be considered as instruments which any one may acquire without much labour, sufficiently, at all events, for the purpose of amusement; and, possessing as they do a power of combination of sounds, have thus an advantage over many solo instruments.

Amongst the instruments exhibited I must notice monochords, pitch-pipes, and tuning-forks. Of the first, those exhibited in the departments of Sweden and Norway

are useful although small, but I do not consider them as eligible instruments for teaching either scales or hymn tunes, as suggested in the Norway department, where the monochord adapted for this purpose has been named Psalmodicon, as the difficulty of learning the system seems to counterbalance any positive utility.

There were many plans suggested for facilitating the acquirement of music; some of these are no doubt ingenious contrivances, and may be recommended for trial; but it is a question whether these ever prove to be regal roads to knowledge; little is ever gained by these clever and well-meant attempts, as in almost every instance. the difficulty of acquiring the rudiments of each new system is the same if not greater than that presented in what may be considered the old system, to which, after all, every other must be referred.

These remarks refer to Mr. Unwin's plan, where the pupil is first initiated into the mystery of music upon one line, then upon two, and so on, and to Mr. Curwen's tonic solfa system, which seems to labour greatly under the disadvantage stated above; but those who wish for information as to what this system is, would do well to consult Mr. Curwen's published books, and thus satisfy themselves.

Among the articles exhibited were musical diagrams and apparatus for shifting musical types. Of these one for learning the formation of scales, by Mr. Howitt, and two for shifting and arranging musical types, by Messrs. Duffield and Ingram, are all ingenious, but elaborate, and consuming much time in the adjustment and explanation.

Of several methods proposed for learning the rudiments of harmony, Messrs. Kirkman's may be recommended for its ingenuity and practicability.

The Exhibition afforded many specimens of cheap musical publications, a most important feature in the advance of the art. It must be in the memory of numbers anxious to learn music that the great drawback formerly was the outlay required for the purchase of music; every means and appliance formed an element of expense. But music is now published at moderate prices; standard works, accurately revised and printed, are now within the reach of almost every class. The names of Messrs. Novello and Davidson stand pre-eminent in this department. To Mr. Novello is especially due the praise of producing the choral works of the great masters at very reduced prices, and the number of choral societies throughout the country, established, it may be said, almost in consequence of this ready supply for their wants, attest the value of his exertions.

Having thus disposed of those matters which were brought under our notice at the Exhibition, I have been requested to throw out the following suggestion: The advance of music generally, but more especially of choral societies, has brought the position of conductor more prominently forward. He has not only to guide the masses committed to his charge as to time, but it constantly becomes a matter of necessity to bring back an erring chorus into the right path, or to recal it to a sense of falling pitch—a usual occurrence where voices are not sustained by instruments. The conductor has no means for correction at hand. His single voice would be powerless, and if an instrument is near he is encumbered with having to move to and fro. Now the Committee suggests a Conductor's Pianoforte, of limited compass, that is, of about two octaves, which might be conveniently placed near the conductor's desk, or indeed form a part of it. If any manufacturer could be induced to construct such instruments at a moderate price, there can be no doubt of their general adoption, not only in the metropolis, but more especially throughout the provinces.

W. W. CAZALET.

INSTITUTE BOOK ORDERS.

September Account.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Ashbourn, Literary Institute .	0	6	0	0	4	9
Berkhampstead, Mechanics' Institution	3	2	3	2	3	4
Derby, Railway Literary Institution	23	18	8	18	9	9
East Retford, Literary and Scientific Institution . . .	0	18	2	0	15	0
Guilford, Institute . .	21	5	10	16	3	5
Hereford, Permanent Library .	3	6	3	2	6	10
London, Bank of England Library and Literary Association . .	8	10	0	6	7	8
Shaftesbury, Literary Institution .	22	12	4	17	1	0
Sheerness, Isle of Sheppy Mechanics' Institution . . .	1	17	0	1	7	5
Stalybridge, Mechanics' Institution	1	13	0	1	3	9
Stamford, Institution . . .	1	0	10	0	16	11
	£88	10	4	£66	19	10

showing a saving of £21 10s. 6d., or about 25 per cent.

IRISH MANUFACTURES FROM FLAX.

[From the "Report of the Irish Industrial Exhibition."]

The articles comprised in this class may be regarded as constituting the staple manufacture of Ireland—that in which she maintains a supremacy over every other country in the world—and hence of peculiar interest in an Irish exhibition. Having, in a previous section of this work, treated of flax as a raw material, we now come to the articles manufactured from it; and in the execution of this task a brief sketch of the linen manufacture will not be out of place.

Up to the latter end of the eighteenth century all the flax yarns of Europe were spun by hand, and gave employment to an immense number of females in their own homes. For centuries the spinning-wheel was the only known method of preparing vegetable and animal fibres for the weaver; and its universal employment led to the designation of spinster, as applied to unmarried females, the use of this implement being an important branch of domestic routine. Nor was it confined to the lower orders. The early chronicles and the plates of Froissart show us that high-born dames were accustomed to pass a portion of every day in spinning, and they are represented as surrounded by their handmaidens, occupied at this industrious employment. Some of the aged members of noble families in our own isles, at the present day, pride themselves on their former expertness in this art, and preserve specimens of their handiwork, with the curiously inlaid wheels which had descended to them as heir-looms. An example of these was in the Exhibition, among the linens shown by Mr. Roddy, of Belfast, where a wheel and reel of elaborate workmanship and elegant materials, once belonging to a noble Ulster family, were shown as emblems of the infancy of the Irish linen manufacture. Before the application of machinery to spinning, the hum of the wheel might have been constantly heard throughout our island; and on market days each little country town was crowded with housewives, carrying their hanks or spangles of yarn for sale directly to the weaver, or to be exchanged at the huckster's shop for the articles of which they stood in need. It was not unfrequent, also, for the women of a family to spin the yarns, which the men, in the intervals of farming labour, or the long nights of winter, wove into fabrics, to be disposed of to the bleachers, or to be fashioned into homely garments for household use. An ample store of linen was the pride of every ambitious housewife, and formed part of the *trousseau* of every bride of certain fortune; and the quantities thus collected by the labour of successive generations was, in the better class of houses, something won-

derful to see. In Brittany, at the present day, among the simple peasantry of that primitive Celtic region, an amusing illustration of this feeling may be noted by the traveller who explores its woods and wilds. He will be surprised to find that the peasants of both sexes wear their linen of all shades, from brown to snowy white, in the inverse ratio to the respectability of their other garments. If he seeks an explanation he will be told that the poorer the individual the whiter will be the linen; those of middle estate will be known by their half-bleached shirts, while the village *seigneur* and his dame stalk in proud majesty, proudly displaying their flaxen envelopments brownly fresh from the loom. And then follows the reason—necessary indeed to the bewilderered tourist—whose snowy shirt and collar of "pure grass bleach linen" are among the outward tokens of his gentlemanly condition, which he most dearly cherishes—that, in Brittany, it is only the wealthy who can afford to wear the brownest fabrics, constantly renewed; while the poor, who have but a scanty supply of linen, must wash and dry, and wash and dry again, the self-same garment, until it attains the hue which, in more civilised countries, is alone prized.

During the hand-spinning period of our linen manufacture a considerable export of Irish yarns took place to England and Scotland, where they were used both for linen fabrics and also as the warp for cottons, before the latter were solely manufactured from the cotton wool. They were likewise employed in the weaving of linsey-woolsey, a union-cloth of flax and wool now fallen into desuetude. Connaught was much resorted to by the merchants for a supply of yarns for these purposes.

In 1793 the first flax-spinning machinery was erected in England; and as it was soon ascertained that yarns could be thus produced much more cheaply than by hand, the trade extended itself rapidly in Great Britain. In 1805 the first flax-spinning mill in Ireland was put up at Cork, and consisted of 212 spindles for canvass yarns. The Linen Board, by giving a bounty of 30s. per spindle, encouraged the erection of several mills, amounting in 1809 to 6,369 spindles. In 1815 there were in Ulster five mills, in Leinster two, and in Munster seven, with an aggregate of about 12,000 spindles.

Up to this period all the yarns were spun dry. About 1822 an improvement was introduced in England. The prepared flax was passed through hot water before being caught by the spindle, and this enabled it to be spun to much finer yarns. In 1825 the Irish market began to be stocked with English machine-spun yarns, sold at such a price as to carry despair to the cottages of the spinners of similar descriptions; for as yet they were but coarse, and the more expert housewives laughed to scorn the idea that iron and brass would ever rival their nimble and experienced fingers. Some manufacturers in Ulster, wise in their generation, began to ponder upon this new feature in their trade. They knew that Englishmen bought the flax at their very doors, carried it across the Channel, spun it in their mills, and returned it in the shape of yarn. They reasoned that if, with comparatively dear labour and with their source of supply and their market of demand both to seek in Ireland, English spinners could make money, factories in Ireland ought to pay, with cheap labour and the supply and demand equally at their doors. Almost simultaneously two enterprising men took steps to secure the advantage of this new branch of industry—Mr. Murland, of Castlewellan, and Mr. Mulholland, of Belfast. In 1828 the first of the modern factories was at work. "*Ce n'est que le premier pas qui coute.*" Thirteen years afterwards, in 1841, there were forty-one Irish factories, with 260,000 spindles. There are now eighty-eight factories with 500,000 spindles. The little Cork precursor of 212 spindles, spinning only yarns like small twine, for canvass, has been succeeded by gigantic factories, several of them containing 20,000 to 30,000 spindles each, and producing yarns up to what is employed for cambric, fine as gossamer. It is true that the hum of the cottage wheel turned by hundreds of thousands of hands, is no longer to be heard in the green valleys of Ireland, and that it has been replaced by the whirr of iron frames, attended by some 23,000 women and children pent up within brick and mortar, chiefly in the capital of Ulster; but the change was not only inevitable but necessary, in order that Ireland should preserve her linen manufacture in its integrity; and the social condition of the female peasantry is actually improved, by the transfer of immense numbers to the embroidering of muslins and various other departments of needlework which have of late attained such celebrity.

To estimate the present magnitude of the Irish flax-spinning trade, let us look at a few plain figures. First, there are 580,000 spindles, representing a capital of £2,370,000 sunk in buildings and machinery. Then there is the direct employment of 23,000 factory workers, earning an aggregate of £360,000 annually; besides the indirect employment to ironfounders, blacksmiths, tinsmiths, carpenters, &c., &c. There are, at Belfast alone, about sixty vessels constantly employed in providing fuel for the motive power of such factories as are driven by steam, which consume fully 200,000 tons of coal annually. Then these factories yearly spin up 30,000 tons of flax and tow, value £2,100,000. And lastly, they produce about 10,500,000 bundles of yarn, value, say £2,800,000.

Of the Irish flax factories, thirty-nine, or nearly one-half are situated in Belfast and its environs, and outside the province of Ulster there are but nine. Two have been recently built, one at Limerick, and the other at Ballyshannon; which may be regarded as feelers thrown out with a view to ascertain whether the charmed circle of Ulster and the east coast of Leinster can be broken, and the other two provinces brought to have a share in the benefits of this trade.

The yarns spun in Ireland are not all used at home, a considerable quantity being exported to Great Britain, Germany, Belgium, and Spain. France, up to 1841, took a very large quantity, but prohibitory duties being then put on by the Chambers there are none now shipped to that country. The export to other places is rapidly increasing; in 1850 it was 4,494,240 lbs.; in 1851, 5,060,160 lbs.; and in 1852, 6,679,680 lbs., valued at £318,700. On the other hand, certain sorts of yarn are imported from England and Scotland, and a small quantity of very fine handspun from Germany and France; in 1852 the import of all kinds was valued at £263,025.

Flaxen yarns are of two sorts, line and tow; the former being made from the long fibres prepared by the process of hackling, the latter from the cottony refuse of that process. Both were well represented in the Exhibition. In the Royal Flax Society's case were samples from 6 lea to 300 lea; that is, from half a hank in the pound, measuring 20 yards, to 25 hanks in the pound, measuring 93½ yards. The same case also showed the scutched flax, the hackled line and tow, the sliver or drawings, and the rovings or last process before spinning. Messrs. J. Hind and Sons, of Belfast, showed an elegant series, up to 320 leas. Messrs. Gradwell, Chadwick, and Co., of Drogheda, exhibited beautiful specimens of all degrees of fineness, comprising some of 360, some of 420, and some of 520 leas. To show the perfection at which machine-spinning has arrived, we may state that 10 hanks of the latter, weighing but 3oz. 11 drs. measure 21 miles; a bundle, therefore, weighing 4 lb. 10 ozs. would reach from the Giant's Causeway to Cape Clear, and leave 118 miles to spare! One of the largest factories, consequently, if spinning, by all its machinery, this delicate thread, would nearly rival Ariel's boast, and

Put a girdle round about the earth
In forty minutes.

The hand-spinning, whose province has been, year by year, encroached upon by machinery, still holds its place for a few high numbers. In 1844, £80,000 worth of foreign hand-spun yarns were imported for the manufacture of cambric. In 1848 this had fallen to £46,000; and in 1851, to £27,750; thus showing that it has by rapid

degrees, been replaced by the product of our factories, and may in a few years more be entirely obliterated. Messrs. S. G. Fenton and Co.'s case of linens contained an extraordinary specimen, spun by a county of Antrim woman, aged 83, of the wonderful grist of 1,120 leas, or 90 hanks in the pound. This is rather more than double the fineness of Messrs. Gradwell and Co.'s finest sample of mill-spun, hitherto unequalled anywhere by machinery; and consequently 3¼ oz. of the former would reach 43 miles, or little more than five ounces would be required to unite the Welsh with the Irish coast.

We may here glance at the position which Ireland has taken in the flax-spinning world, which the following table will illustrate. There are in the flax factories of each country where this industry exists, as follows:—

In Ireland	580,000	spindles.
England	345,000	ditto
Scotland	303,000	ditto
France	476,000	ditto
Belgium	102,000	ditto
Zollverein	80,000	ditto
Austria	74,000	ditto
Russia	50,000	ditto
United States of America	14,500	ditto
Switzerland	8,000	ditto
Holland	6,000	ditto
Spain	6,000	ditto

Closely allied to flax-spinning is the linen thread manufactures. Yarns, spun in the usual way, are only employed in the manufacture of woven fabrics. To fit them for the use of tailors, dressmakers, and shoemakers, they require to be re-twisted, to render them of sufficient firmness and strength. Several of the British and Irish spinning factories have attached to them thread-twisting frames, and for the material so produced there is an extensive demand, both at home and abroad. In 1852 the United Kingdom exported 3,788,497 lbs. of threads, value £338,821. There are four or five of the Ulster flax-spinners who have attained much celebrity in this branch of the trade, and their threads are sold throughout the British Islands, and in many of the continental states.

The first great impulse given to the Irish linen trade arose from the effects of the famous revocation of the edict of Nantes, by Louis XIV. A colony of some seventy persons, from France and Belgium, under the direction of an experienced manufacturer, M. Louis Crommelin, settled in Ulster, and under the auspices of government applied themselves chiefly to the introduction of the continental processes, which were then very superior to the routine observed in Ireland. The Irish Linen Board, which began its labours in 1711, continued for more than a century to exercise a watchful supervision over this growing trade; and, as some equivalent for that arbitrary enactment, in the reign of William III., by which the British parliament destroyed the Irish woollen manufacture, considerable sums were appropriated by Government to this purpose; the yearly vote from 1711 to 1737 being £6,000, and afterwards £20,600. The Linen Board, through the stimulus it gave to the trade, was certainly productive of much benefit to the nation. The now exploded system of bounties led, however, to much abuse; and early in the present century it was found that the Irish linen manufacture could stand by itself without further aid from the state. Since then it has assumed a healthiness, and progressed with a rapidity which amply demonstrate the peculiar natural advantages possessed by Ireland for this manufacture.

Before the application of machinery to the spinning process, the trade was quite of a domestic character. It was carried on throughout Ireland, in the cottages of small farmers, and of weavers in the country towns. The linen was brought for sale to certain markets, where bleachers attended and bought it up, these bleachers being generally the shippers of their own goods. By a return made to the Linen Board, in 1816, we find that the value of the linens thus sold in the country markets of each province was as follows:

In Ulster	£2,323,962
Leinster	265,460
Munster	62,856
Connaught	127,774
Total	£2,780,052

It will be seen that, even then, Ulster had by far the greatest share of the trade; the industrious character of its inhabitants, and their aptitude for manufacturing employment, distinguishing them from the people of the other provinces, who were then, as they continue to be, almost exclusively tillers of the soil. In the county of Antrim alone, £697,600 worth of linens were sold in 1816, or 50 per cent. more than in the three southern provinces put together.

After the introduction of machinery for spinning, the hand-spinning soon ceased, and as almost all the factories were in Ulster, weaving concentrated itself there also. At the present day, with the exception of a district round Drogheda, and a few localities of Cork and Mayo, no linens are woven without the boundary of the northern province.

Soon after the revolution in spinning, the weaving system underwent considerable changes. Persons possessing capital and a knowledge of the trade embarked as manufacturers, employing a number of weavers, to whom they gave out the yarns bought by them in quantity from the spinners, already boiled and warped. Some spinners, also, found it advantageous to manufacture their own yarns, and even to buy from others; and they employed as their agents individuals in country districts to whom the yarns were sent, and were by them distributed amongst the weavers, and returned as woven fabrics to the spinners, who either sold them to bleachers and shippers, or bleached and exported them on their own account. At present there are only four or five markets in Ulster where buyers attend as formerly; and even in these few linens are sold by weavers, being generally disposed of in lots by manufacturers. The more extensive of the latter employ 500 to 2,000 weavers each.

Since the famine of 1847, consequent on the loss of the potato crop, linen weaving has been considerably affected by the social changes arising therefrom. Previously, in Ulster, many persons existed, partly on their earnings as weavers, and partly on the produce of the small tracts of land which they held. The latter grew the potatoes, which constituted the staple of their food, and the earnings of the former enabled them to pay rent, to buy clothing, and to provide the humbler luxuries. When the potato failed they found themselves unable to exist with comfort; a considerable emigration ensued, and their land was consolidated into larger farms. Consequent upon this decrease in the supply of weavers a considerable advance in wages has recently taken place; and even with this advance enough cannot be had to keep pace with the increase of the linen trade. So much inconvenience has arisen that great efforts have lately been making to adapt the power-loom to the weaving of linens.

Owing to the want of elasticity in the fibre of flax, as compared with cotton and wool, it has been found difficult to employ the power loom for weaving those light fabrics which constitute the bulk of the export, and which form also the great mass of the Irish make. At Dundee and Barnsley, and in other parts of the sister island, the power-loom is employed in the weaving of heavy fabrics, such as canvass, bagging, drills, &c., and 3,660 looms are thus occupied. In Ireland the number of those worked by power was, until this year, under 100. Great exertions, however, have been lately made, and are now making, to render the power-loom available for ordinary light linens, and the future extension of the linen trade must greatly depend upon the success of these trials.

As is always the case in kindred manufactures, the dif-

ferent sorts of linen fabrics are confined to certain localities. Thus, coarse linens for blouses, &c., and for the common kinds of export goods, are chiefly made in the county of Armagh; medium and fine kinds of export cloth, about Ballymena and Coleraine; damasks and diapers at Lurgan, Lisburn, and Belfast; lawns, at Lurgan and Dromore; cambrics, at Lurgan, Waringstown, and Dromore; heavy linens and sheetings, for the home market, at Banbridge; hollands, in the counties of Antrim and Armagh; shirt fronts, woven in plaits, at Dromore: and the coarsest fabrics, such as bed-ticks, coarse drills, &c., at Drogheda.

As to the destination of the Irish linen manufactures, every one has heard that they are to be found selling throughout the globe; that

"From China to Peru, from Indus to the Pole,"

in every part where floats the British flag, Irish linens are a well-known article of commerce; and yet Irish legislators have gravely stated, in their place in parliament, that the linen trade of their country had fallen off grievously, and that in 1852 only 50,964 yards were exported to foreign countries! Let us examine this apparent inconsistency. In 1852, out of 58,602 packages of linen fabrics shipped from Belfast, only 27 were sent direct to foreign countries, and yet there are several Belfast houses, each of which has transactions in linens with foreign states, averaging from £50,000 to £300,000 annually, or equal to a million and six millions of yards respectively. The explanation is simple, and it is this:—Before the extraordinary facilities offered by steam navigation, and before the growth of Liverpool, London, Glasgow, and Southampton, as *entrepots* for export, the Irish merchant shipped his linens direct from Belfast to foreign ports. In 1800 the then large quantity of 3,126,340 yards was thus exported. Week after week the vessel lay in the docks, loading slowly for New York, or Havanna, or Rio Janeiro, awaiting the shipments of the manufactures. Now every steamer leaving Belfast, Newry, or Derry, carries its 50, or 100, or 500 boxes and bales of linens, to Liverpool, Glasgow, London, and Southampton. In those ports are to be found vessels filling up rapidly with woollen, and cotton, and silk, and hardware goods, for every port in the world where British commerce flourishes. Every week fast-sailing steamers depart for America, and for the Mediterranean and the Levant. And every week the customers of the Irish linen manufacturer receive fresh consignments through these convenient channels. In a word, Liverpool and Glasgow are to Belfast what they are also to Manchester, Sheffield and Paisley—the great shipping ports; and hence the official figures of Irish exports are no longer to be relied on as indications of the extent of the Irish linen trade with foreign states.

SEWAGE MANURE.

At the request of the Metropolitan Commissioners of Sewers, Mr. Thomas Wicksteed has recently made a "Report upon the most advantageous mode of dealing with the Sewage Matter of the Metropolis, with a view to the preparation of Sewage Manure," from which the following are extracts:—

"It will probably be considered useless to adduce any additional evidence to that already obtained, to prove that the sewage water of towns contains much valuable fertilizing matter, as the fact that it does so, is now, I believe, universally admitted; and that its value is not attributable solely to its containing urine and excrementitious matter in a state of dilution, but also to other ingredients from dye works and manufactories, producing refuse of animal and vegetable matter; and the ammoniacal refuse from gas works also adds to its value.

"It is well known that urine and excrementitious matter, where it can be collected separately and properly diluted in farm-yard tanks, its strength being proportioned to the crops for which it may be required, is far superior, quantity for quantity, to the contents of town sewers generally; but the sewers of a manufacturing town will contain larger quantities of refuse from manufactories in proportion to the whole quantity of sewage water than of refuse from water-closets.

"It is also well known that the application of manure to crops in a liquid form is in a great many instances more advantageous than when used in a solid form, especially when applied to green crops; the question, however, of the amount of dilution in the liquid form has either been blinked or has had too little importance attached to it, and thus the term "liquid manure" has been used indiscriminately, not only to represent that collected in farm-yard tanks, but also that obtained from the sewers of towns, in which the supply of water being deficient the dilution has not been great, and again to the sewage water of the metropolis and other large towns, where the dilution as compared with the other two cases may (not unfairly) be termed excessive, being probably six or seven times greater; but to those unacquainted with such facts, the indiscriminate use of the term creates the idea that *all* liquid manures are equal in value; and hence the statements that have been published as to the very beneficial results of the application of liquid manure, should be received with great caution, however truthful the individual statements may be.

"There can be no doubt that the flood waters supplied from a district, the land of which is chiefly arable, will produce a much more beneficial effect upon green crops than those from a barren or mining district; in the latter case it may be positively injurious. There can also be no doubt that the beneficial effect produced in the first case arises chiefly from the fact of the waters containing the manure that has been washed off the arable lands during the progress of the flood, and I should imagine there could be as little doubt that the quantum of benefit derived from the application of these waters must in a great measure be in proportion to the *solid* contents of the fertilizing matter with which they are impregnated.

"It would therefore appear evident that any comparison made between the liquid manure used by the German farmers, and that used by the proprietors of the Edinburgh meadows, and others, the beneficial result of which have been published, and the sewer water of the Metropolis, or that of New York, where the supply of water is now reported to amount to 90 gallons per head per diem, and those large towns in Great Britain where abundant supplies of water are now afforded, could only lead to error, unless the actual amount of solid fertilizing matter contained in each water be first ascertained.

"Nevertheless, with all this knowledge upon the subject, the difficulty of applying the sewage-water of *large* towns in a liquid form, so as to produce a *commercial* benefit, has not been overcome, and the additional experience I have obtained since 1845 induces me to adhere to the opinion I then expressed, namely, that the difficulties are insuperable." * * *

"To enable me to comply as strictly as possible with your instructions, and as the adoption of any particular plan, must, at last, depend upon its being capable of producing commercially a beneficial effect, I have endeavoured to make an estimate of the cost of conveying the sewer water of the metropolis to, and distributing it over, agricultural districts; and, although I have arrived at an estimate which will be sufficiently large, I imagine, to settle the commercial question, I can only consider this amount as a portion of what the ultimate cost might be in carrying out a scheme, which, after an examination of the following statements, you will probably agree with me in terming purely chimerical.

"The population of the metropolis, according to the last Census, amounted to 2,362,236; the increase from 1831 to 1841 was at the rate of 17¾ per cent.; and from 1841 to 1851 at the rate of 21½ per cent.; and supposing the increase in the next ten years to be at the rate of 20 per cent., in 1861, it will amount to 2,834,683.

"From the vast increase in the supply of water which is rapidly taking place, I consider that 36 gallons, or rather more than 5¾ cube feet, per individual per diem, would be a fair amount to estimate upon for the future.

"At this rate the daily quantity of sewage water will amount to 102,048,588 gallons per diem, or 166,719,190 tons per annum.

"According to the analysis of the eminent chemists, Professor Brande and Mr. John Thomas Cooper, 150 tons of sewer water from King's Scholar's Pond Sewer, contained 1-500th part, or 6 cwt., of solid matter, which may be considered a sufficient average quantity for an acre of ground per annum: the solid matter contained in 166,719,190 tons of sewer water will, therefore, be equal to 6,668,760 cwt., which, at 6 cwt, per acre, will supply an area of 1,111,460 acres.

"The extent of district to consume this quantity will be rather more than double, or 3,500 square miles, equal to a circle of 66½ miles in diameter. The main pipage required will be equal to 1,236 miles, varying in diameter from 38 inches to 12 inches.

"The steam power required will be equal to 16,152 horses, working under a pressure equal to a column of water of 500 feet.

"The capital required will amount to nearly 12,000,000*l*. sterling.

"The quantity of coals required per annum will be about 170,000 tons.

"The annual cost for coals, labour, stores, and repairs for engines and buildings will amount to £240,000 stg.

"Supposing 10 per cent. upon the capital to be sufficient to cover all disbursements, including 5 or 6 per cent. interest upon capital, this will amount to £1,200,000 per annum, which for 333,438 tons of solid matter will give a cost of £3 11s. 9d. per ton.

"A detailed calculation is given in the Appendix, but the foregoing will perhaps be sufficient to convince the Commissioners that the liquid scheme, even if it could be carried out as herein proposed, is not a feasible one; but when, in addition to what has been stated, it is borne in mind that the basis upon which the calculation rests is upon the assumption first that the whole of the sewage water could be collected into one central spot; secondly, that twelve 38-inch radial pipes could be laid in straight lines from this central point; thirdly, that the circle of 66½ miles in diameter round the Metropolis is a flat plain, and that the Surrey Hills on the South, and the Middlesex and Hertfordshire Hills on the North, do not exist; fourthly, that a sufficient number of landed proprietors could be found within the proposed extent of district to use so large a quantity of one kind of manure; and as the supply must be constant, to construct covered reservoirs on their lands to hold the supply during such periods as it is not being actually poured upon the land; and unless these to me impossible conditions can be complied with, the estimate for £12,000,000 will be found much too small;—I think the Commissioners will agree with me that such a scheme for the disposal of the sewage water of the Metropolis should not be entertained.

"Having years ago, as before mentioned, formed the opinion that, however valuable the application of liquid manure to land might be, and however economically and profitably it might be supplied on a small scale, that upon the large scale it was in effect commercially impracticable, I turned my attention to the application of it in a different form, and I will now proceed to give the Commissioners such information as my experience enables me to do, as to the feasibility of extracting from the sewage water fertilising matter in a solid form.

"The real difficulty that has existed with reference to most of the schemes proposed for the disposal of the sewage, has been that of dealing with large quantities. A scheme may be a very good one, and based upon right principles, and may be carried out effectually and profitably upon the small scale; but as has been shown in the case of the liquid scheme, the difficulties that present themselves to carrying it out upon the large scale are frequently insuperable, and a scheme that might answer remarkably well for each of a hundred small towns, would be commercially impracticable if applied to one town having a population equal to the aggregate population of the hundred small towns: for example, the plan that has been proposed for filtering sewer water through a charcoal medium would be good, inasmuch as the charcoal would absorb a good deal of fertilising matter, and is at the same time a good deodorant. Now, taking a population of 5000, and assuming the supply of sewer water to be equal to 36 gallons per head per diem, or 5,776 cube feet; this would be equal to 180,000 gallons per diem; and supposing three-fourths of this to be supplied in 12 hours of the day, it would be equal to 135,000, or 187½ gallons per minute. Now for the perfect filtration of ordinary river water, such as the Thames or the Lea, it requires two square yards of filtering surface to clear one gallon per minute; but for extraordinary water, such as is found in the river Clyde in certain seasons of the year, and which is discoloured by vegetable matter, it requires about 5½ square yards of filtering surface to render the water colourless; but taking the two square yards as being sufficient for the sewage, it would require a filtering bed of 375 square yards, or rather less than one-twelfth of an acre, to clear this quantity of water. Such would be the size for a small town; but taking the Metropolis, as before estimated, at 17,057 cubic feet, or 106,299 gallons per minute, it would require a filter-bed of 44 acres area, or 1,383 feet square. Such a plan, therefore, supposing it to be in other respects eligible, however suitable for a small town, would probably be deemed inapplicable to the Metropolis.

"It will, perhaps, be readily admitted that any plan proposed for the disposal of the sewage of the metropolis, or any other town, should be subject to two conditions, —first, that the sewage water, before exposure to the open air, should be thoroughly disinfected: and, secondly, that the residue or noxious matter which is taken from it should not only be converted into a source of profit, but that the operations required to produce this conversion should be such that no nuisance may arise therefrom in the neighbourhood.

"If the water is merely deodorized, and the precipitate matter is left to accumulate, it will not only require reservoirs of very great area, but when the supernatant water is drawn off, and the mud at the bottom has to be removed (as it must be periodically), its removal will not only be expensive, but from the large extent of surface that must necessarily be exposed, it might become a source of serious nuisance, at the same time that the separation of those gases which exhale and cause the nuisance would reduce *pro tanto* the fertilizing value of the deposit; hence it is obvious that such reservoirs would have to be constructed at a considerable distance from the habitable portions of the metropolis.

"But when, in 1845, I proposed to construct similar reservoirs at Barking Creek and the Greenwich marshes, my object in proposing outfalls so distant from the metropolis, was rather with a view of conciliating the then popular prejudices than from a belief that the works themselves if brought any nearer to London, would have been in any way prejudicial to the surrounding neighbourhood, for I had at that time ascertained the effect of the action of lime upon sewer *water*, and finding that the water was completely deodorized, I assumed that the precipitate would be equally so; but subsequent experience has proved to me, that when large surfaces of the wet mud at the bottom of a reservoir are exposed by the removal of the supernatant liquor, the smell arising from it is unpleasant although I believe perfectly innoxious, and as this smell is produced by the evaporation of the fertilizing ingredients, as before observed, it became an all important matter in a commercial point of view to avoid unnecessary exposure, and I believe by the process I now adopt, and which will be explained hereinafter, the object has been fully attained." * * *

A short statement of the progress of Mr. Wicksteed's investigations as to sewers and sewage follows, from which it appears that in 1851 he took out a patent for the manufacture of sewage manure, and that in the following year "An Act of Parliament was obtained, incorporating the 'Patent Solid Sewage Manure Company,' and enabling the Company to raise capital to the extent of £100,000. In February, 1852, the Directors resolved that temporary works should be erected in Leicester for the purpose of manufacturing the manure upon a sufficiently large and practical scale, having in view three objects:—the first being to ascertain whether the lime process effectually disinfected the sewer water, and if so, whether it could be practically used upon the large scale; the second, to ascertain whether the removal of the precipitate from the bottom of the reservoir, and the abstraction of the water from it by means of centrifugal force, could be practically carried out upon the large scale and at a sufficiently small cost; the third object being, to manufacture a sufficient quantity of the manure to enable agriculturists to prove its commercial value, considering that their practical opinions would be a much better test than chemical analyses only, and it was resolved that upon the result of these trials, the question of proceeding with the Company should be decided. Works were accordingly erected, and after many alterations and improvements upon the original scheme, which probably would not have suggested themselves unless the opportunity of carrying the plan out practically had been afforded, the Directors were so satisfied with the result, that they felt justified in entering into a contract with the Town Council of Leicester, undertaking in return for the exclusive right to all the sewage water for a period of thirty years, to disinfect it, and discharge the water in an innoxious state into the river Soar for the same period."

The completion of these works, the estimated cost of which is £25,000, has been delayed by unforeseen circumstances. The temporary works at Leicester, which were calculated for a population of 5,000, are then alluded to, and the results completely satisfied Mr. Wicksteed that the scheme is not only practicable and remunerative, but may be made very profitable when carried out on a larger scale than opportunity has hitherto afforded.

"The mode of operation in this process is as follows:—The water is pumped up from the sewer, and into the pipe conveying it to the reservoir a smaller pipe is introduced, connected with the lime pump, which works stroke for stroke with the sewer water pump, and the process of deodorising is so rapid, that when the mixture of sewer water and lime is discharged into the reservoir, there is no noxious odour arising from it; the discharge takes place into the first part of the reservoir divided into three compartments, in each of which is an agitator worked by the engine: a thorough mixture having thus been effected, it flows through the upper end of the reservoir, and is from thirty to forty minutes passing through this portion, during which time seven-eighths or more of the separated matter has been precipitated on the bottom of the reservoir; there still remains, however, about one-eighth of solid matter, and which being lighter than the first portion, requires a longer time for precipitation, so as to render the water clear and bright.

"The water is, in fact, two hours in passing from the sewer to the farthest end of the reservoir, where it is discharged, and arrangements are made to enable the water to flow continuously through the reservoir with as nearly as practicable the same velocity over the whole section, the openings of the discharging gates being proportioned to the depth of water in the cross section, and thus the necessity of having two reservoirs, for the purpose of filling one while the water in the other is being cleared by deposition, is avoided, for although the stream is continuous, its velocity being only about one-fourth of an inch per second, it does not interfere with, or arrest, the precipitation of the solid matter.

"The operation of removing the precipitate from the bottom of the reservoir, so as not to interfere with the continuous flow of the water in the reservoir, is performed by means of a screw, which removes the precipitated matter into an adjoining well or shaft as rapidly as it is formed, without disturbing the process of precipitation which is carried on above it.

"The bottom of the first portion of the reservoir is made to slope towards the centre, along which a culvert runs, semicircular at bottom and open at top; in the bottom of this the screw is laid, and the precipitate collecting upon it from the sloping sides, is, as the screw revolves, carried into the adjoining well; the practical working of this arrangement is now completely successful.

"It is the combination of these two arrangements; viz. —the continuous current and the removal of the deposit without disturbing the supernatant water, that has enabled me to reduce the size of the reservoirs to so great an extent; this will be seen hereinafter, when I give the sizes of the reservoirs I propose for the Metropolis.

"The next operation is to raise the deposit or mud from the well or shaft, by means of a Jacob's ladder, very similar in appearance and construction to the ladder of buckets in the dredging machines used on the Thames, excepting that its position is vertical and its construction much slighter; the mud thus raised in a semi-fluid state into a tank, flows through a pipe to the centrifugal machine, the machine is then set in motion at the rate of about 1,000 revolutions per minute, and in half an hour from the time the precipitate lay on the bottom of the reservoir, it is in a sufficiently dry state to pack in casks or to mould in the form of bricks for further drying.

"A given bulk of the manure, when introduced into the centrifugal machine, is reduced to about one-third of its original bulk, two-thirds, as water, having been separated from it by the operation.

"The machines which are now making for the new Leicester Sewage Works are each calculated to turn out 360lbs. of manure in an hour, in the state of consistency previously mentioned.

"Thus it will be seen, that the whole operation of disinfection and conversion into manure is very simple, and I think it must appear evident, that after the experience of a year and half of what may be done in works sufficient for a population of 5,000, that by simple multiplication of the means, it may be made available for any population, however great; as in this case the increased quantity of sewage water merely involves a simple increase of machinery in proportion to this increase, the increase of power for raising it being in direct proportion to the quantity.

"There is one very important conclusion that may be drawn from what has been said; viz.,—that an increased supply of water, by which means only the greatest and most immediate sanitary effect will be produced upon the atmosphere of dwellings in any town, does not render the plan just described abortive, on account of the enormously increased expense, but, on the contrary, within certain limits, the more the sewage is diluted the more complete is the effect of the disinfection of the water and the precipitation of the manure, so that the sanitary objects of the Commissioners and the commercial interests of a Company carrying on the works, would not be opposed to each other as would be the case in the event of the liquid scheme being adopted.

"In the temporary works, at Leicester, although the reservoir, the steam-engine and boiler, the machinery for manufacturing the manure, and the store for the manure, whether in casks or exposed in heaps for drying, are under one roof, no noxious effect has in the slighest degree been caused to the workmen employed in the process; and although the manure itself, when taken from the cask and held to the nose has a smell which an agriculturist would not object to, nevertheless, no smell whatever is preceptible at the distance of a foot or two from the manure.

"As regards, however, the proposed large works for

Leicester, there will be two reservoirs, about 200 feet long and 44 feet wide; two-thirds of the area will be covered with an iron girder and brick arch floor for the warehouses above, to economise space, and the whole will be roofed over; and as this portion of the design is intended to be carried out in all future works, however large, all chance of nuisance from exposure is avoided; but the fact is completely established, that no nuisance does arise either from the reservoirs or in the process used in manufacturing." * * *

"Although not in a position at present to state what the 'actual commercial value of the residual manure' will be, because, as before intimated, the desire of the directors of the Patent Solid Sewage Manure Company has been to leave this to be determined by the result of its practical application by the agriculturist, and at present the manure that has been so applied has been *pro tanto* inferior to what is intended to be supplied, in its having been chiefly collected from the day sewage unmixed with the richer night sewage, and also from the fact of its containing 60 or 70 per cent. of water instead of 20 per cent., which is the quantity it would have contained, if the extent of our temporary works had afforded us room for drying it in larger quantities than has hitherto been practicable; nevertheless, our experience has been quite sufficient to prove that, without the necessity of having recourse to expensive application of artificial heat, simple exposure to atmospheric influence for a few weeks will reduce the moisture to 20 per cent., so that, bulk for bulk, the manure intended for sale will contain twice as much fertilizing matter as that which has at present been forwarded to agriculturists for trial. The present results, however, show that, taking guano at £10 per ton, the manure, as proposed for sale, is at least worth £2 13s. per ton; but as I stated to the Commissioners verbally, I have considered it safest to calculate its commercial value at £2 or £2 2s. per ton, and this amount would yield, after deducting the cost of manufacture and repairs, a fair per centage upon the capital expended in the construction of the works; but the actual value will not be ascertained until time has afforded more extensive experience." * * *

"The cost of manufacture will be proportionably greater in small works than in larger ones: my present experience, however, enables me to state, that upon the average the cost of manufacture will not exceed 20s. per ton."

The Report concludes by stating, that four sites at least should be obtained for the proposed works for the utilization of the sewage of the metropolis, and that the capital required for the construction of the works of the prospective population, would not exceed £1,000,000 sterling.

Home Correspondence.

LITERARY AND SCIENTIFIC INSTITUTIONS ACT, 1854.

As the letter of Messrs. Hudson and Hutchings in last week's Journal in no way displaces any of the statements made in the Secretary's letter, and leaves untouched the main points at issue, the Secretary deems it unnecessary to avail himself of his right to reply, more particularly as the replies of Mr. Hutt and Mr. Chester will be found below. With these the discussion on this subject must be closed.—Sec. S. of A.

Sir,—Allow me to make a few comments on the very long letter, from Dr. Hudson and Mr. Hutchings, which appeared in yesterday's Journal.

In their circular of the 6th September, 1854, they charged "the office of the Committee of Council on Education" and the "Society of Arts" with a deep-laid scheme to bring the operations of the Institutes under the control of the Government. There was no foundation for this charge. It has completely broken down; and not even an attempt has been made to sustain it.

Dr. Hudson and Mr. Hutchings also charged the Society with a dereliction of duty in promoting a Bill in Parliament for dealing with the Institutes without amending the act which exempts them from rates. It has been proved that those gentlemen had approved of the Bill, and expressly of its omitting to touch the question of the rates.

Dr. Hudson and Mr. Hutchings now blame the Society for hurrying the bill through the Commons. The Minutes of the House of Lords demonstrate that, if the bill had been delayed one single additional day in the Commons, it could not have been read a second time in the Lords.

Dr. Hudson and Mr. Hutchings assert that I said that I "knew nothing about the bill." I never said anything of the kind. I said that I had nothing to do with it within two specified periods. It is unnecessary for me to remind some of your readers that I was not "asleep" during the month of July.

The Conference clearly declared its opinion not against any appeal at all to the Charity Commissioners, but against any appeal in any ordinary matter coming within the natural legal powers of the members, and against any appeal from a small minority in any extraordinary matter requiring the exercise of the new and unusual powers proposed to be given by the Bill to the members of an Institution, in respect of the variation or extension of its constituted objects. The Bill, as altered by Mr. Hutt in consultation with the deputation, accurately represented, as I believe, the views of the Conference. The Institutes had not, and it was idle to expect that Parliament would give to them, unchecked and unlimited, a power of extending or altering the objects for which they were established. Ought such a power to be given unreservedly to a chance majority? Many of our Institutes would be unsafe if a chance majority, without any power of appeal or of redress, could take the funds contributed for one purpose, and apply them to another. The deputation had settled with Mr. Hutt a very carefully considered clause which, while it gave full power to the members acting openly and deliberately to vary and extend their objects, guarded effectually against secrecy and surprise, and enabled a minority of not fewer than two-fifths of the members to appeal to the Commissioners of Charities. It should be remembered that, before the passing of this Act, any one member, by an application to the Court of Chancery, might prevent an extension or variation of objects.

The provision for an appeal thus carefully prepared was most unfortunately struck out in the Commons, at the instigation of Dr. Hudson and Mr. Hutchings. The consequence was that it became impossible to pass the Bill through the Lords. A power of appeal to the Board of Trade was therefore inserted, and in a modified form was assented to by those gentlemen. They admit that in the Commons they did nothing but throw out the appeal clause, which I, for one, think was unobjectionable; and that in the Lords they assented to an appeal clause which I, for one, think very objectionable indeed.

I do not in the least doubt their good intentions. We all know that Dr. Hudson has rendered many and great services to the Institutes. I cannot however but think that the course taken in this instance has proved to be unfortunate, and I regret much to find them using language well calculated, though not intended, to excite feelings of jealousy and distrust where it is of the utmost importance that truthfulness and cordiality should prevail, and that good offices should be freely interchanged.

I am, Sir, your obedient servant,

HARRY CHESTER.

Highgate, near London, October 7, 1854.

Yorkshire Union of Mechanics' Institutes.
Central Committee at the Leeds Mechanics' Institution and Literary Society.
Leeds, 9th October, 1854.

SIR,—A few more words on the Literary and Scientific Institutions Act.

As one of those who had a share in the modifications of the Literary and Scientific Institutions Act, permit me to add a few words to the correspondence on this subject. Before doing so, allow me to say that I very much regret that there should be any disagreement between the two bodies,—the Society of Arts and the Lancashire and Cheshire Union of Institutes. Both are labouring for the same objects, both mean to do do good, and nothing but ill can arise from any divisions.

Whether the clause respecting the appeal to the Charity Commissioners was agreed to be modified only, or to be struck out, appears to me, now that the Act has passed, a point of the most trivial importance. Mr. Hutt and Mr. Woollcoombe entertain one opinion, Mr. Valentine and myself another. There the matter might end, and I only regret to see it treated as a subject of dispute.

Whether Messrs. Hudson and Hutchings did wisely in endeavouring to get the clause giving an appeal to the Charity Commissioners struck out in the Commons, is a matter of opinion which I believe they had as much right to decide for themselves as had anybody else. I had nothing to do with this part of the affair, and did not know anything of it, till the clause giving an appeal was *reinserted* in the Lords. In so acting they were but endeavouring to get carried out the almost unanimous wish of the conference of delegates. The proposed interference of the Charity Commissioners was objectionable —1st. Because any interference on the part of Government would not be desirable, unless it offered actual benefits, which this did not. 2nd. Because, from the amount of work waiting for the Charity Commissioners (one cause per day for the next century, saith the *Times*), no Institute that found an appeal needful would ever get its affair settled. An appeal to the Charity Commissioners would last as long as a Chancery suit.

But whether Messrs. Hudson and Hutchings did wisely or unwisely in getting the appeal clause struck out in the Commons, there can be but one opinion as to the service they rendered when it was reintroduced in a tenfold more objectionable form in the Lords. The Society of Arts, and all the Institutions in the country, owe those gentlemen their gratitude for both the promptitude with which they opposed the clause, and the success which attended their efforts. In any future measures which the Society of Arts deems it desirable to carry through the Legislature, on behalf of the Institutions, they had better watch the progress of the bill *till it becomes law;* otherwise they may find that, through the meddling of legislators utterly ignorant of the Institutions, strange and unjustifiable regulations may get introduced. That which it was proposed to make into law, and what would have been law, if Messrs. Hudson and Hutchings had not interfered (for as to myself, till these gentlemen summoned me to London, I thought the bill was going on all right, under the care of the Society of Arts), would have compelled every Institute to have submitted *every alteration* in its rules to the Board of Trade. No news room, no day school, could have been added, no change of any kind could have been made, without their consent,—a consent that very possibly might frequently have been withheld. And even if the Board of Trade never objected to the proposed alterations, the constant reference to them would have caused endless trouble and annoyance.

As the clause *now* stands, the necessity of appeal to the Board of Trade can hardly ever occur, and it may be considered as practically inoperative.

The alteration in clause 24, which, *as it stood*, made the whole body of members the governing power, but, as it now *stands*, places the management in the directors, was also, I think, a decided improvement.

The question of exemption or no exemption from local rating cannot remain in its present most unsatisfactory state. I trust the Society of Arts will, at its next Conference, elicit the opinions of the delegates on this question. Either all should pay or all should be exempt. The Institutes could afford to give up exemptions (which are always objectionable) if proper aid were rendered to them. In towns this should be done by the municipal authorities; in the rural districts by the Committee of Privy Council for Education, or some other authority. Till this be done, good and systematic instruction will never be extended to the bulk of the people, and sorry am I to find more than one gentleman actually employed by government in the education of the people, taking up the strange and anomalous position of opposing all such assistance. The education of the uneducated seems to me the primary duty of any body *professing to govern;* and for those who know our governors well, to affirm it dangerous to entrust them with that office, is to pronounce upon them the strongest possible condemnation. Upon this point, however, I will not say more at present. I trust that the Lancashire and Cheshire Union of Institutes, and all the local Unions, will cordially support the Society of Arts, and that the latter will see by what has just occurred, that if they mean to secure our confidence, they must carefully watch over our interests, as I am sure they are disposed to do.

I remain, dear sir, yours respectfully,
JAMES HOLE.

SIR,—I wish to say a last word in reply to the letter of Messrs. Hudson and Hutchings in your last number.

Had these gentlemen been content in their address to the Lancashire and Cheshire Association of the 6th September, with setting forth their own fabulous exploits in regard to the Literary and Scientific Institutions Bill, I should never have challenged the accuracy of their statements. It would indeed have been difficult to repress a smile or a sneer at the fantastic tricks by which they were seeking to create a stock of credit with the Association, but such expression of my feelings would not have penetrated beyond my retirement.

Messrs. Hudson and Hutchings however thought fit, in order to swell their own importance, coarsely to accuse me of falsewood in dealing with the deputation from the Society of Arts; and though I supposed it was hardly necessary for me to defend myself from such a charge, especially in a matter where I could have had no motive for falsehood, I thought a statement of the facts would afford persons of ordinary pretension to candour an opportunity of retracting an unbecoming imputation. I showed, therefore, through the intervention of Mr. Woollcoombe, that the accusation was destitute of foundation. Far from retracting, Messrs. Hudson and Hutchings only persist in their calumny, and call for "stronger evidence" than I have given that I did not gratuitously violate every word. Had not these persons Mr. Chester's excellent letter of the 27th September before their eyes, and can they ask for stronger evidence than that letter affords, that I acted with good faith towards the deputation, and that they have been dealing in language and imputations which they ought to be ashamed of? Mr. Chester says that at the interview between me and the deputation "it was arranged with Mr. Hutt that the appeal should be to the Charity Commissioners." What do Messrs. Hudson and Hutchings want after this? Messrs. Hudson and Hutchings call on me to say how it happened that in the House of Lords the Board of Trade was substituted for the Charity Commissioners. I will tell them. Mr. Hudson was the cause of it. Mr. Hudson's representations induced Mr. Milner Gibson to propose to strike out of the bill, on the third reading, the reference to the Charity Commissioners. I did not willingly consent to such a change; I thought the Charity Commissioners an unexceptionable authority for the purpose. They are a judicial body; they are independent of the Court of Chancery and of the Government, and in certain cases they already exercise by law a

jurisdiction over these Institutions. I agreed, however, to Mr. Gibson's proposal because I knew that in the peculiar position of Parliamentary affairs a discussion at the third reading would defeat the bill, by consuming time. I was pushed to the last moment. In my former letter I mentioned that I consented to withdraw the Charity Commissioners. I mention it, not for the purpose of implying that I approved of the step, but clearly showing that Mr. Hudson's statement to the Lancashire and Cheshire association, that "by the zealous and untiring assistance of Mr. M. Gibson and other enlightened parliamentary representatives, this part of the Bill was rejected on the third reading, at two o'clock in the morning," was sheer fiction. Mr. Hudson, however, certainly caused the words to be struck out. When the Bill went up to the House of Lords, some members of that House who took an interest in it, represented to me that it would be impossible to allow the Institutions a power of altering their own charters at will, without naming some authority to control so extraordinary a privilege, and they proposed to restore the jurisdiction of the Charity Commissioners. I replied that after what had passed between me and Mr. Gibson, I could be no party to such a proceeding, especially as Mr. Gibson had left town and would not be present when the Bill came again to the House of Commons. The Peers therefore inserted "the Board of Trade," to which, with Mr. Chester, I entertained strong objections, but to which I was constrained to submit. My hands were tied by my engagement to Mr. Milner Gibson. Mr. Hudson says—"it now became necessary that some energetic steps should be taken to check the centralizing influences which were at work; accordingly, he and others repaired to London, where they had interviews with several public men, and "secured by their aid an organised opposition in the House of Commons to the amendments there proposed by the Lords."

And with all this pother what was done? Did "the energetic steps" give any check to "the centralizing influences?" No such thing. The objectionable clauses passed the Lords, and when they came down to the Commons Mr. Hudson s organised opposition immediately agreed to them. It is to be presumed that they approved of them. It was thus that Mr. Hudson caused a department of the Executive Government to be placed in authority over the Mechanics' Institutions of the country. He first contrived that the tribunal—competent, suitable, and independent of all Government influence—named in the bill, should be rejected; and then, as it became necessary to find a substitute, and the Lords named the Board of Trade, he being in London, and cognisant of all that was going on about the bill, and in close communication with many members of the House of Commons on the subject, who might easily have stayed the evil when it came before them, suffered it to receive the final sanction of the Legislature. The truth is that these men in buckram, this organised opposition, together with the long story told to the Lancashire and Cheshire Association about the amendments by which Mr. Hudson's vigilance and wisdom rescued the Institutions from thraldom, and defeated the wicked designs of myself, the Society of Arts, and the Government, these things are all, moonshine. They never had an existence. Mr. Hudson, as Mr. Chester remarks, caused one change to be intoduced into the Act, and that change, by the consent of all parties, is of a very mischievous character.

Your very obedient servant,

Gibside, October 9, 1854. WILLIAM HUTT.

SIR,—As this important measure has now become law, will you permit me to inform such of your readers as take an interest in the spread of Education, and the sustainment of Literary Institutions in Ireland, that the Act has been extended to that country.

In a former letter which I had the honour to address you, I called attention to the omission of Ireland from the provisions of the Bill. At that time the measure had been read a third time in the House of Commons. I immediately wrote on the subject to Lord Monteagle, and to his Lordship's kindness do we now owe, what will, I am convinced, turn out to be a great and signal advantage to the Institutions in Ireland. I trust not one of them will remain without a copy of the Act, or fail to avail themselves of its provisions.

While rendering a sincere though humble testimony to the readiness with which Lord Monteagle assisted in the extension of the Act to Ireland, I may, on behalf of the Society I represent, be also allowed to thank the Council of the Society of Arts, who were the promoters of the measure.

I have the honour to be, Sir,

WILLIAM LANE JOYNT,

President, Limerick Literary and Scientific Society.

September 5th, 1854, 82, George Street.

NAVAL SEMINARIES.

SIR,—The President of the British Association for the Advancement of Science, the Earl of Harrowby, said, in his inaugural address, that "until a very late period the assistance to scientific education furnished in this country, either by educational institutions or the State, was very slight, and totally unworthy of the object or the nation." After noticing the efforts of eminent individuals for the advancement of science, and particularizing the many ways in which the nation is dependent upon it for a continuance of its prosperity, his lordship went on to say, "What did the State do for these things? Why absolutely nothing. * * * A school of naval architecture, which, at the bidding of a narrow economy, and at the instance of practical men, it abolished when the fruits were ripening; a school of naval instruction at Portsmouth, which it dropped." On this subject of general scientific instruction in the naval department, I humbly beg permission to offer observations, not from any presumption of my own adequacy to discuss the subject, but because circumstances happened to inform me intimately of the proceedings which took place sixty years ago and upwards, for extending scientific training to thousands of the then rising generation, and because the then and subsequent proceedings indicate that the public mind was not till of late years ripe for the adoption of such a measure, rather than that Government was insensible of its beneficial tendency.

The plan proposed about the year 1793 was a "School of Arts," the thousand or two of its pupils being to be instructed in the various sciences on which arts and manufactures depend for their advancement and perfection. It was to have been a private establishment, and the eminent John Julius Angerstein of that day engaged to find funds sufficient for the requisite building. The scheme was, however, abandoned on the appointment of its contriver to the new office of Inspector-General of Naval Works. Earl Spencer then presided at the Admiralty. His lordship, himself a man of science, was already aware of the want of it in the naval department, when he made the acquaintance of General Bentham, and of his views in regard to scientific education; accordingly, his lordship encouraged the Inspector-General in the preparation of a scheme for the more appropriate rearing of the several classes of persons in the naval service, both civil and military. The plan devised by the Inspector-General was approved of by His Majesty's ministers, particularly by Mr. Pitt, who engaged to furnish the requisite funds for the first establishment of four schools, of 1,000 each, in the four principal dockyards; indeed, Mr. Pitt was desirous that six such schools should be established. This plan was about to be carried into execution in the year 1800. At Earl Spencer's desire the sketch of a Report to the Lords of the Privy Council had been drawn up by the Inspector-General and Sir Evan Nepean, in which "Articles 45 and 48" were as follows:—"That, for the purpose of affording, at the least expense, a constant supply of artificers of every denomina-

tion, not only for the works of the dockyards, but likewise for the service of the fleet, and for the further purpose of affording a more scientific and appropriate education than at present, to the persons who are bringing up to be in future employed, particularly in the direction of the operative branches of naval concerns, there be established a naval seminary, at each of the dockyards of Woolwich, Chatham, Portsmouth, and Plymouth. * * That previously to the age of fourteen they (the pupils) be employed chiefly within the precincts of the seminary, part of the day in works of various kinds, such as oakum-picking, peg-making, line-spinning, nail-making, boat-building, and the remaining part of the day in writing, arithmetic, and drawing." At General Bentham's request the sketch was printed and transmitted by the Admiralty to many persons deemed competent to give opinions upon it, amongst others to the then Comptroller of the Navy, who objected to most of the proposed regulations; and, in regard to seminaries, noted that "every increasing permanent expense of a dockyard should be kept down as much as possible." The Inspector-General, in his official "Observations on the Comptroller's Objections," stated his perfect agreement with the Comptroller in this respect as a general proposition, but that he (the Inspector-General) looked upon the establishment of these seminaries "as an expedient particularly well adapted to do away with a considerable part of the very great increase which has of late years been made to the expense of the dockyards, and to keep it down in future." He afterwards states, "the ways in which I conceive these seminaries would operate towards the reduction of the expense of a dockyard are as follows:—1. By affording the work of apprentices, while they are bringing up to the different handicraft trades, subservient to the business of a dockyard, at a much less expense than hitherto has been allowed for that purpose. 2. By increasing the number of artificers obtainable in time of war, and thereby giving greater despatch to the refitting of ships, which are now detained from sea in a state unfit for service, at a very great and inefficient expense in seamen's wages and sea stores. 3. By increasing the number of artificers on board the fleet, thereby affording the means of doing a great deal of work on board ships at sea, or in distant parts, for the doing of which it is now necessary, in many cases, to incur the expense and delay occasioned by the coming to a dockyard. 4. By increasing the total number of shipwrights in the kingdom, and thereby rendering their combinations and standings out for exorbitant increase of wages, and other unwarrantable purposes, less likely to happen, as well as, if ever they should happen, less effectual; so that the price of ship-building work in private establishments, as well as in his Majesty's dockyard, may be reduced to a more moderate rate. 5. By furnishing a number of hands accustomed to live occasionally on board ship as well as on shore, who may be sent to any dockyard, or to a ship anywhere situated, without expecting to receive on that account any additional pay; and this not merely in the case of such of the apprentices themselves as may have attained a proficiency adequate to such services, since there seems no reason to doubt but that when the working indiscriminately ashore or afloat is considered as a necessary part of the education of a shipwright previously to his advancement as an officer, abundance of volunteers would present themselves for such services. 6. By affording a system of education for those employed in the navy as well as in the dockyards, whereby those whose duty calls them to trust their lives in ships, may be better acquainted than they are at present with the circumstances of construction on which their personal safety, as well as credit and success, may depend; and those whose business it is to prepare the ships for service, may be better acquainted with the use and management of them. From the opportunities I have had in forming an opinion on such a subject, I have been convinced that the advantages which would arise from extending in this manner the ideas of the several descriptions of persons employed in naval concerns, would in the way of ultimate saving much more than compensate for the expense of this establishment, even though none of the immediate savings above-mentioned were to be expected from it."

After mature consideration the Comptroller's objections were esteemed by Government to be fallacious, and various details were in the course of arrangement, when a change of administration brought the Earl of St. Vincent to preside at the Admiralty. His lordship had already been consulted as to the sketch of the report generally, and as to the Naval Seminaries in particular, so that no part of the plan was new to him; but the Speaker of the House of Commons having signified, through General Bentham, the necessity of presenting *immediately* to the Lords of the Privy Council some report on the dockyards, a short one was accordingly submitted, but in which no details were entered into respecting the intended seminaries. His lordship, however, still continued his approbation of the plan for naval seminaries, and was about to carry it into execution when another change of Ministry took place, and the urgency of warfare absorbed all other considerations, and the Inspector-General was sent by Government to Russia.

The School of Naval Architecture at Portsmouth, spoken of by the Earl of Harrowby, exhibited in practice several of the peculiarities which had been proposed by the Inspector-General for affording an appropriate education to the superior description of persons in question. But it may be observed that this institution failed from its inherent defective constitution. It was not in any respect *self-supporting*, and the Admiralty considered itself as bound to give employment to the pupils when out of their apprenticeship. The consequence was, that in some cases the Admiralty had to create new offices for some of the young men; many others accepted inferior employments in the dockyards, and have languished for the promotion their talents entitled them to expect; whereas in the proposed naval seminaries no prospect was held out of permanent engagement in the King's service. The greater number of the *élèves* were to pay a small sum for board, their labour compensating for other expenses they occasioned. Their tuition completed, they were at liberty to continue in the service, were it their inclination, and that Government had need of them. There were three classes of pupils, the operative, the middle rank, and the one for superior officers, naval and civil; and provision was made for the advancement of distinguished talent, even from the lowest to the highest class. But it seems unnecessary now to enter into details, since the Society of Arts already possess a copy of the original paper on the "School of Arts," as devised by General Bentham, as also of his proposal for the naval seminaries in the Royal dockyards.

It may, however, be observed, that no other establishment has been yet devised wherein education of so varied and so scientific a nature could be obtained as in the Naval Seminaries, combining, as they did, general instruction with the manipulation of materials, without which no adequate knowledge of any art can be obtained.

M. S. BENTHAM.

30th September, 1854.

MR. THWAITES'S CYPHER.

SIR,—I feel much obliged to your correspondent "C" for the time and attention he has devoted to my challenge. (*Vide* Journal of September 15th.)

It would be ungenerous in me to do more than allude to the Number in question, and equally improper, (as regards the subject matter of my patent), to continue a controversy through any public channel until the objects of the patent are specified. Acknowledging the provoked attention of "C," and his urbanity, I thank him—

"Quicquid sub terrâ sit, in apricum proferet Œtas."

I beg to remain, yours faithfully,

JOHN H. B. THWAITES.

17 Park-street, Bristol, October 11th, 1853.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Oct.* 6*th*, 1854.]

Dated 31*st May*, 1854.

1209. J. Bernard, Club chambers, Regent street—Boots and shoes.

Dated 13*th September*, 1854.

1989. W. M. Campbell, Glasgow—Prevention of smoke.
1991. J. Brookes, Birmingham—Waistcoat.
1993. J. Betteley, Liverpool—Ships' standing rigging.

Dated 14*th September*, 1854.

1995. J. Hossack, Manchester—Apparatus for measuring flow of liquids.
1999. A. and G. Wilson, Nottingham—Knitting machinery.
2001. W. B. Hayes, Manchester—Looms.
2003. T. Purdon, Hull—Safety lamps.
2006. G. F. Evans, Kew bridge, and F. J. Evans, Horseferry road—Distilling coal, &c.

Dated 15*th September*, 1854.

2007. J. W. Perkins, Poplar terrace—Purifying gas.

Dated 16*th September*, 1854.

2009. S. Collins, Birmingham—Furniture castor.

Dated 18*th September*, 1854.

2012. J. Ashworth, Bristol—Sizeing textile fabrics.
2014. G. Thorne and S. Lemon, Fore street—Signboards, &c.
2016. O. D. Smal, Huy—Oven for metals.
2018. T. Lewis and A. Bartle, Birmingham—Purifying water.

Dated 19*th September*, 1854.

2020. G. Piercy and G. Collins, 28, Judd place West—Heating liquids for baths, &c.
2022. J. Porter, Salford—Nuts, bolts, and screws.

Dated 20*th September*, 1854.

2026. M. Billing and W. G. Whitehead, Birmingham—Waterproof paper.
2028. W. Garnett, Clitheroe—Warping and sizeing yarns.
2030. J. H. Johnson, 47, Lincoln's inn fields—Glass furnaces. (A communication.)
2032. A. E. L. Bellford, 16, Castle street, Holborn—Machines for drilling stone. (A communication.)
2034. A. E. L. Bellford, 16, Castle street, Holborn—Governor. (A communication.)
2036. A. E. L. Bellford, 16, Castle street, Holborn—Horometer for solving trigonometrical problems.

Dated 21*st September*, 1854.

2038. W. P. Sharp and W. Weild, Manchester—Silk machinery.
2040. M. Moneyment, 63, Lamb's Conduit street—Hat, bonnet, and other boxes.

WEEKLY LIST OF PATENTS SEALED.

Sealed October 6*th*, 1854.

796. Emile Dupont, of Boulogne-sur-Mer—Improvements in the manufacture of certain cements.
800. Julian Bernard, Club chambers, Regent street—Improved mode of stitching or uniting and ornamenting various materials, and in machinery or apparatus for the said purpose.
801. James Worrall, junior, Salford—Improvements in the method of bleaching fustians and other textile fabrics, and in the machinery or apparatus connected therewith.
807. Frederick Robert Augustus Glover, Bury street, St. James's—Improvements in two-wheeled carriages.
820. William Naylor, Norwich—Improvements in locomotive engines.
821. William Naylor, Norwich—Improvements in power hammers.
843. Zachariah Round, Dudley—Improvement or improvements in bricks to be used in certain parts of buildings.
847. Charles Anthony Noedl, Upper Saint Martin's lane—Portable vapour bath.
851. Thomas Hawkins, LL.D., Northfleet—Apparatus for creating an upward draught or current of air in chimneys, which apparatus is also applicable to the purposes of ventilation.
863. William Henry Bentley, Bedford—Improvements in cannons, guns, and other fire-arms, and in projectiles for the same.
897. Jean François Felix Challeton, Brughat—Machinery for purifying and condensing peat, and also for conveying it.
949. John Lawson and Somerville Dear, Leeds—Improvements in looms for weaving.
1029. George Barry Goodman, 12, Salisbury place, New road—Improvements in apparatus for holding together letters, music, and other loose sheets.
1049. Henry Tylor, Queen street, City—Improvement in chair bedsteads.
1065. John Platt, Oldham—Improvements in apparatus or machines for forging, drawing, moulding, or forming spindles, rollers, bolts, and various other articles in metal.
1091. George Manwaring and William Alltoft Summers, Southampton—Improvements in supplying water for water-closets, for the flushing of drains, and for general purposes.
1145. John Biggs, Kent—Improvement in the mariner's and other compasses, by isolating and rendering them insensible to the disturbing influence of local attraction of iron, steel, and other bodies.
1255. John Nicholson, Blackwall—Improved ratchet, screwing, and drilling stock, which may also be used as a spanner.
1273. Richard Archibald Brooman, 166, Fleet street—Improvements in machinery for cutting brads, lath-nails, and others of similar character.
1645. Thomas Huckvale, Choice hill, near Chipping Norton—Improvements in machinery for gathering crops.
1711. Samuel Lawrence Taylor, Cottenend, Bedford—Improvements in constructing and arranging the beaters and dressing machinery of thrashing machines.
1725. George Addison Cox, Lochee, Dundee—Improvements in machinery or apparatus for winding yarns or threads.

Sealed October 10*th*, 1854.

848. John Mitchell, Dunning's alley, Bishopsgate street—Improvements in machinery for pulverizing, grinding, amalgamating, and washing ores.
850. Thomas Schofield Whitworth, Salford—Improvements in the mule for spinning and doubling cotton and other fibrous materials.
854. Benjamin Fothergill and William Weild, Manchester—Improvements in machinery for combing cotton, wool, flax, silk, and other fibrous materials.
864. Emile William Hansen, Saxe Gotha—An electro-magnetic engraving machine.
867. John Greenwood, Irwell Springs, near Bacup, and Robert Smith, Bacup—Improvements in sizeing, stiffening, and finishing textile materials or fabrics.
869. James Griffiths, Moorgate street—Improved portable measuring instrument.
873. Thomas Lawes, 32, City road—Improvements in protectors for the head.
875. Alexander Chaplin, Glasgow—Improvements in the application of cast iron to building purposes.
879. Georges Louis Félix Tiret, Paris—Improved canvas for embroidering.
884. Benjamin Fullwood, Bermondsey—Improvements in the manufacture of cement.
928. Joseph Gill, Marsala—Improvements in apparatus for the distillation of spirituous liquors.
961. Frederick Woodbridge, 3, Green's Terrace, Lower road, Rotherhithe—Improvements in furnaces.
970. Joseph Porter, Salford, and Richard Howson, Manchester—Improvements in forge hammers.
971. Edward Briggs and William Souter, Castleton Mills, near Rochdale—Improvements in treating and preparing silk, and in machinery connected therewith.
1182. William Stenson, junior, Whitwick Collieries, near Ashby-de-la-Zouch—Improvements in steam-engine valves.
1339. Henry Worrall, Staley bridge—Improvements in machinery or apparatus for carding cotton, wool, or other fibrous materials.
1416. William Morgan, Birmingham—Improvements in machines for cutting paper, card, and millboards, woollens, veneers, and materials used in making paper; parts of which improvements are applicable to other machines where quick and slow motions are used, and where machinery is required to be thrown into and out of gear.
1542. Rudolph Bodmer, 2, Thavies Inn, Holborn—The application of glass, crystal, or other vitreous material, or of earthenware (céramique), to certain parts of machinery.
1667. Amable Hippolyte Petit, Paris—Improved mode of joining pipes.
1672. Edmund Burke, Upper Thames street, and Alexander Southwood Stocker, Poultry—Improvements in the manufacture of metallic tubes and such like articles.
1699. Samuel Lees, Salford—Improvements in machinery or apparatus to be used in purifying gas for illumination.
1727. John Hall Brock Thwaites, Bristol—Improvements in apparatus to facilitate the communication by cypher.
1739. Alexander Ogg, Glasgow—New composition applicable to the cementing of leather.
1787. William Kennard, 32, Little Queen street, Holborn—Improvements in attaching door or other knobs and handles.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Oct. 5.	3645	Round Edge Cross Cut Wheel Roller ...	Hugh Carson	Wiltshire Foundry, Warminster.
10.	3646	The Portland Gum or Damper Vase......	John Ralfe	Old Montague Glass Works, Old Montague street, Brick lane, Whitechapel.

Journal of the Society of Arts.

FRIDAY, OCTOBER 20, 1854.

SUBJECTS FOR PREMIUMS.

The Council, in issuing the subjoined List of desiderata, would urge upon the Members of the Society generally, and others, the importance of communicating detailed accounts of new processes in the Arts or methods of Manufacture, of any new Mechanical arrangements by which these may be simplified, or labour saved, and of any novel application of Raw Materials, whether previously known or not, to useful purposes. It is quite possible that some of the things here set down as to be done, may have been already accomplished: but in such cases the knowledge of them is extremely limited, the facts not having been made public. It is the object of this Society to provoke discussion on the subjects with which it deals, to see that nothing is concealed which may in any way tend to promote the good of all, and to record the facts and opinions thus elicited. The weekly meetings, and the *Journal of the Society of Arts*, afford the requisite facilities for effecting this, and the Council earnestly hopes that the opportunities thus given may be taken advantage of.

Classes I. to IV.—Raw Materials.

1. For an account of the methods adopted in working Metalliferous Mines.
2. For an essay on Ancient Metallurgy.
3. For an account of the various commercial Copper Ores, of the smelting process, and the methods by which the precious metals can be separated from Copper.
4. For the best essay on Iron Ore, and the Manufacture of Iron as carried on in different districts and countries; especially contrasting the Iron Manufacture of England with that of America and the Continent of Europe.
5. For an account of the Manufacture of Tin, and of recent discoveries of new sources of supply.
6. For an account of the modes by which *Wolfram* can be separated from other ores; and on the uses of Tungsten in the arts.
7. For any new application of Tungsten in Arts or Manufactures.
8. For an account of Menaccanite or Iserine; and suggestions for obtaining Titanium from these ores.
9. For any improvements in the process of smelting Zinc ores.
10. For any improvement in the process of condensing the Fumes in the Smelting of Lead Slags.
11. For the best account of the production of Sulphur and Arsenic from the metalliferous ores of the United Kingdom, and statistics of the use and export of these substances.
12. For the discovery in England, or the importation from any of the British Posessions, of Plumbago, or of some other substance which may be used in lieu thereof, equal in quality to that obtained from Cumberland.
13. For an account of the methods now in use for separating Silver from Lead Ores.
14. For the best essay on the Manufacture of Steel as carried on in different districts and countries; especially contrasting the Steel Manufacture of England with that of America and the Continent of Europe.
15. For an account of the best proportions for the production of the compound metal Bronze; and the preparation of Bronze washes.
16. For the invention of a White Metallic Alloy, free from microscopic faults, which may be successfully applied to the Arts; is hard enough for use in reflecting telescopes, and is not liable to be acted upon by the atmosphere.
17. For the discovery or manufacture of a New Smokeless Fuel, which shall not occupy more space, or be of greater weight than the fuel now in use; and shall be equal in the amount of heating power, without liability to injure metals in contact with it.
18. For the most complete series of specimens of Products obtained from Coal, other than gas and coke, with an account of the processes employed in their manufacture, and the purposes to which they are or may be applied.
19. For an account of the processes employed in obtaining different products, as Parrafine, from Shale, and the uses to which they may be applied.
20. For the discovery in England of a bed or beds of pure White Sand, suited to the manufacture of Glass, and possessing similar properties to the French sands used in the same manufacture.
21. For an account of the economic manufacture of Colours by Electricity.
22. For an account of the economic manufacture of Oxide of Zinc, and its incorporation with other colours, so as to render them not liable to be acted upon by sulphurous gases, or to fade on exposure to light and heat.
23. For the preparation of any Colour, applicable to the japanned surfaces of Papier Maché, that shall be free from the brightness (or glare) of the varnished colours now used, but yet possess the same degree of hardness and durability.
24. For an account of the best method of manufacturing Artificial Ultramarine, with suggestions for the extension of its production in this country.
25. For the best specimen of English-made Artificial Ultramarine.
26. For the preparation of light colours to be used in Enamelling or Japanning Slate or Iron that will stand the action of heat from the fire without blistering or discoloration, and be sufficiently hard to resist scratches.
27. For an account of the processes involved in the preparation of Animal Charcoal, and its recent applications to manufacturing and other purposes.
28. For an account of the Raw Materials obtainable from different parts of the world, that are not yet generally introduced into commerce.
29. For the importation of not less than half a ton of well-dried Plantains, or Bananas, from the West Indies.
30. For the importation from Australia, New South Wales, or Van Dieman's Land, of not less than fifty pounds of Dried Fruits, of good marketable quality.
31. For the importation of not less than one pipe of Wine, of good marketable quality, made from the produce of Vineyards in Australia.
32. For the best essay on the theory and practice of Fermentation, particularly as applied to the Art of Brewing; so as to modify, or altogether dispense with, the intermediate process of malting.
33. For a substitute for, or preparation of, Yeast for raising bread, that may be preserved for use, better than any hitherto generally known.
34. For an account of the processes employed in the manufacture of Starch,—the sources from whence it is obtained, and the purposes to which it is applied.

35. For improvements in the processes for Preserving Animal Food, and for preventing salted and other provisions becoming rancid; with an account of the methods at present employed.
36. For the best and simplest means of Preserving Milk for use on Shipboard.
37. For an essay on the construction of Beehives and the Management of Bees, with an account of the different qualities of Honey and other products of the Bee, obtainable from various districts and countries.
38. For an account of the Gums of Commerce.
39. For the discovery and production to the Society of any new substance which can be successfully used as a Substitute for Gutta Percha.
40. For the production of a perfectly Colourless Copal Varnish, not liable to injure the colours over which it is applied.
41. For the production of a Colourless Gold Size, not liable to affect the delicate tints with which it is mixed when used to facilitate their drying.
42. For a pure Colourless Oil suitable for Artists; or for a decolourizing agent for linseed oil which will leave its other properties unimpaired.
43. For an account of the Manufacture of Garancine, as now practised in France, commencing with the best processes for grinding the root to powder; with observations as to such modifications as might be necessary for rendering similar machinery available for grinding Indian munjeet or madder.
44. For the production of cheap Purple and Yellow Lakes, of good quality, suitable for carriage-builders, &c., and not liable to fade or change colour.
45. For the importation of at least two tons of any New Vegetable Fibre, applicable to all the purposes for which Flax or Hemp is now used, and equally strong and durable.
46. For the best samples of Ornamental Woods from New Zealand or any other British Colony, new to Commerce and suitable for the manufacture of Furniture.
47. For the importation of the largest quantity of American White Hickory, for the year ending 1855.
48. For the discovery of an economic and effective substitute for the Teazels used in raising the face or nap of cloth.
49. For the best essay on the distribution of Beds of Shells, and sources of supply of Mother-of-Pearl, especially those hitherto undeveloped by commerce.
50. For a method of preparing an Engine Size for the use of Papermakers, superior to any now in use.
51. For the best account of the mode in which Size from Sea-weed is prepared and used by the Chinese.
52. For the best series of useful Products from Seaweeds, the methods of obtaining them, and the purposes to which they are or may be applied.
52*. For an effectual method of utilizing the Sewage of Towns.

Classes V. to X.—Machinery.

53. For an account of recent improvements in, or applications to, the Furnaces of Steam-engine Boilers, for the consumption or prevention of Smoke, without increasing the expense of working.
54. For an account of improvements in the Furnaces of Manufactories, especially in Glass Works, Iron Foundries, and the like, for the consumption or prevention of Smoke.
55. For the best essay on Motive Agents, either that have been introduced or proposed, and the peculiarities of the machinery for utilizing the power obtained, with the results of experiments.
56. For the best essay on Electro-Magnetic Engines.
57. For the adaptation of a new submerged Propelling Power in Marine Navigation, which shall possess all the advantages of the screw propeller, and be more directly acted upon by the moving power.
58. For an account of the mechanical means at present in use to facilitate the operation of Packing Goods, whether by hydraulic presses, or otherwise.
59. For economical and durable sets of the Standard Weights, Measures, and Balances of Great Britain, suitable for the use of Towns, Public Companies, Universities, Schools, and the Colonies.
60. For the best form of Street Goods' Waggon; the improvements required are a lower centre of gravity, and a ready means of discharging heavy packages.
61. For an account of recent improvements in Machinery for breaking, cutting, and dressing Flax.
62. For the best and most economical mode of Cutting out Boots and Shoes by Machinery, so as to effect a saving of time and material.
63. For an account of the methods now in use for working Malleable Iron; and of any recent improvements in the machinery employed for converting iron into bars, plates, &c.
64. For the invention of a simple Machine, by which plates of cold iron, say seven feet by three feet, and from one-eighth to one-half inch thick, may be readily cut either lengthwise or across, in equal parts, or in any other proportion that may be required.
65. For an account of recent improvements in the manufacture of Sugar from Beet-root, in Great Britain and Ireland, and of the results obtained.
66. For the best account of recent improvements in the Construction and laying out of large Breweries, and the "Plant" connected therewith.
67. For improvements in the employment of Gas for Domestic purposes, especially for heating, ventilating, and cooking; with the cost and results thereof.
68. For a cheap and efficient Meter, for experimental purposes, for registering small quantities of Gas.
69. For an account of the successful manufacture of Hydro-Carbon Gas, with the cost of its production.
70. For an Elastic Material for Tubing suited to the conveyance of Gas, and not liable to be affected by alterations in temperature, or to be acted upon by the gas itself.
71. For improvements in the Ventilation of Emigrant Ships.
72. For improvements in the Oxy-Hydrogen Microscope, and the means by which a bright object may be presented on a dark ground.
73. For an essay on mechanical and other contrivances for Reducing, Enlarging, Copying, and Reproducing Mechanical Drawings; to be suited to the purposes of the lithographer, &c.
74. For a rapid means of Reproducing Artistic Designs or Sketches, without the intervention of hand labour, for surface printing by machinery.
74.* For a means of producing impressions from Copper-plates by Machinery, without the intervention of hand labour.
75. For the invention of a simple Electrometer, to be sold at a moderate price, for determining the amount and kinds of atmospheric electricity; and which will show uniform results under uniform circumstances.
76. For the invention of a Marine Mercurial Barometer, which will obviate the oscillation of the mercury and fulfil all the conditions necessary to make it a good and reliable instrument, and be sold at a moderate price.
77. For the invention of an Anemometer for determining the direction of the wind, and its pressure in lbs. on the square foot; to be sold at a moderate price.

78. For the invention of an Anemometer, for measuring the force and direction of the wind on board ship correctly, distinguishing the amount due to the wind and that due to the ship's velocity, varying with the angle.

79. For a Machine that will satisfactorily determine great depths at sea by compression, free from the errors of absorption of air, if that be employed, or from the inequalities of a spring, if that be used; and upon a scale of sufficiently large dimensions throughout to be practically useful and correct.

80. For an Instrument that will detect the Local Attraction of a ship at sea with reference to the compass, by direct observation of the heavenly bodies, *without* the process of turning the ship.

81. For an Artificial Horizon that can be practically employed at sea, and which will give the altitude of a heavenly body with sufficient accuracy for the purpose of navigation.

82. For a Self-registering Thermometer for great depths at sea, that will not be deranged by checking and hauling up the line, and that will give the maximum and minimum of temperature passed through.

83. For improved arrangements for wet and dry bulb Thermometers.

84. For the invention of a self-registering minimum Thermometer.

85. For a simple Mechanical Bucket for drawing up specimens of water from moderate depths at sea while the ship is under weigh, and of such material as will not readily affect the water enclosed.

86. For an improved simple Azimuth Compass of moderate price.

87. For a Conductor's Pianoforte, of limited compass, that is, of about two octaves, which might be placed near the conductor's desk, or form part of it.

CLASSES XI. TO XXIX.—MANUFACTURES.

TEXTILE FABRICS AND MATERIALS.

88. For the production of a lustrous Wool, to be used in lieu of silk, in the manufacture of fringes, carriage-laces, &c.

89. For an account of an improved method of Transferring the Pattern from the original design to the cards of the Jacquard Loom, so as to lessen the number of cards required.

90. For the successful application of some new means, (as Electricity or Photography, for instance) for producing Ornamental Designs in Woven Fabrics, which shall be cheaper and easier of application than those at present employed.

91. For an account of the methods at present practised in France for dyeing and dressing Morocco Leather.

92. For an efficient means of removing the fatty matters from Skins, so as to render them capable of receiving mordaunts by the ordinary printing process.

93. For the best mode of dressing Kid for the upper leathers of Boots: the improvements required are, strength of the grain and a good firm black dye.

94. For a Statistical Statement of the various materials used in the Manufacture of Paper.

95. For the best specimen of Paper, not less than 1 cwt., produced either wholly or in part from new materials, such materials not being more costly than those now used; with full particulars as to the manufacture.

96. For the best series of Tinted writing and packing Papers coloured in the pulp, made from materials not suited for the manufacture of white paper.

97. For the best method of Colouring Paper in the pulp with indigo, and with greens of various hues, the colours not to be liable to be affected by gases.

98. For improvements in the manufacture of Transparent Papers.

99. For the best method of Glazing Paper in the web.

100. For a method of more thoroughly Sizing Machine-made Papers with Animal Size.

101. For the invention of a means of Copying Letters, by which the inconvenience at present attending the use of the "style" may be obviated, and both the original and the copy shall be permanent.

102. For a ready means of taking a limited number of impressions of written documents, as letters, &c., on ordinary writing paper.

103. For an account of recent improvements in the manufacture by steam power, of Carpeting, whether Brussels, Velvet-pile, or Terry; especially of processes by which the warp-threads are coloured to form the pattern before weaving.

104. For the best mode of finishing the edges of machine-made Bobbin Lace (in imitation of pillow lace), so as to supersede the use of the separate pearl edge, usually sewn on.

METALLIC, VITREOUS AND CERAMIC MANUFACTURES.

105. For the production of Castings in Iron, equal in sharpness and delicacy of surface to those now imported from Berlin.

106. For the cheapest and best smoke-consuming and fuel-economising Open Grate.

107. For the cheapest and best application of smoke-consuming and fuel-economising principles to Domestic Fire-places.

108. For the best adjustment of a Tubular Chimney, with ventilator to the above, with the results of the trials of its working.

109. For the best Water-closet, with the following properties:—1. A scour for the complete removal of the soil. 2. The best trap against the ingress or regurgitation of effluvia from the general system of drainage with which each soil-pan must communicate. 3. The consumption of the least quantity of water for a complete scour and perfect trap. 4. Durability, or freedom from the liability of (*a*) breakage in consequence of frost; (*b*) derangement of the machinery; (*c*) breakage by careless usage; (*d*) stoppages. 5. Easy repair. 6. Cheapness when manufactured on a large scale.

110 For the best essay on Ancient Goldsmiths' Work.

111. For the best specimen of Figure Chasing in Silver, out of the solid plate.

112. For the best specimens of Cisterns suitable for household or other purposes, made of Glass in one piece.

113. For a cheap quality of Glass, applicable for drains, water-pipes, sinks, shelves for larders, dairies, &c., in which coarseness and want of transparency are not regarded.

114. For the best specimens of Glass for Chemical use, capable of resisting a high degree of heat without softening, and not liable to break from changes of temperature.

115. For the best specimen, in imitation of Venetian or ancient Glass, of a useful Jug, drinking Glass, or Dish; every specimen must be left exactly as finished by the glass-blower.

116. For any important improvement in the construction of Kilns for firing or baking Parian, China, and Earthenware.

MISCELLANEOUS MANUFACTURES.

117. For an essay on Architectural and Decorative Ornaments; the materials employed, their mode of manufacture, and the comparative cost of production.

118. For an essay on the best examples of Modern Furniture in various materials, exhibiting sound principles of construction, in combination with decorative art.

119. For a Chair or Couch affording the greatest possible amount of support to persons of weak physical powers whilst writing.

120. For a Composition for the Feeding-Rollers for Printing Paper-Hangings by cylinder machinery, similar in consistency and texture to the gelatine rollers used in letter-press printing, but which is required to work in water-colours.
121. For an account of any material improvement in the Moulding, Burning, or general Manufacture of Bricks; the chief qualities required being strength, indestructibility, and cheapness.
122. For the best form of Kiln for the manufacture of draining tiles, hollow bricks, roof tiles, paving tiles, or common bricks; which Kiln shall be the cheapest and simplest to construct, with the least quantity of materials for transport; the most complete combustion of fuel, and the least in consumption, with or without means of drying in the Kiln itself or in a shed attached to it; to be verified by trial works and the cheapest production of perfect goods.
123. For the best and cheapest white or light-coloured Glazed Tiles and Bricks, to be used in cottage construction.
124. For a means of imparting additional firmness and tenacity to the Clay used for Artistic Modelling, without diminishing its plasticity.
125. For an account of the Clays produced in these Islands and their uses, with especial reference to the manufacture of stone-ware pipes, for sewage, and other sanitary purposes.
126. For a means of rendering the Plaster used for Casts less absorbent and more adhesive, so as to facilitate its use for repairing purposes.
127. For the best means of Utilizing Refuse Ores, refuse Coal, and impure approximations to coal.
128. For the best means of turning to useful account Slag, in a coarse, refined, or combined state.

CLASS XXX.—FINE ARTS.

129. For the best specimen of Modelling and Medal Die sinking. An impression from the die, and the original model to be sent to the Society.
130. For the best design for a Flower Trough or Vase, ornamented in Bas Relief, and capable of being cast from a mould in one piece, and of being produced in Terra Cotta.
131. For the best cheap set of Plain Vases in China, Earthenware, or Terra Cotta, suitable for mantel-piece ornaments.
132. For the best cheap set of Plain Vases in Glass, suitable for mantel-piece ornaments.
133. For the best series of four Outline Drawings in illustration of Longfellow's poem "Building the Ship."
134. For the best series of four Outline Drawings applicable to ornamental purposes, and illustrative of Acts of Mercy.
135. For the best series of Botanical and Structural Drawings of a Forest-tree.
136. For the best series of Botanical and Structural Drawings of the Cercalia.
137. For the best series of coloured Botanical and Structural Drawings of any well-known English Plant.
138. For the best series of Drawings of any Animal, displaying its anatomy.
139. For the best series of large Drawings or Diagrams, suitable for Lecturers, in illustration of any special subject of Natural History applied to manufactures, as the Hemp or the Flax-plant.
140. For the best series of four large Drawings or Diagrams, suitable for Lecturers, in illustration of any piece of Machinery, as a Loom, Steam-Press, Paper Engine, &c.

N.B.—The drawings of the last six subjects not to be less than 3 feet by 4 feet.

NOTICE.

The Society in all cases expressly reserves the power of rewarding each communication in proportion to its merit, or even of withholding the Premium altogether.

All communications must be written on foolscap paper, on one side only, with an inch and a quarter margin. They must be accompanied by such drawings, models, or specimens as may be necessary to illustrate the subject. The drawings should be on a sufficiently large scale to be seen from a distance when suspended on the walls of a meeting-room.

In regard to Colonial Produce of all kinds, it is absolutely necessary that a certificate from the Governor, or other qualified person, should accompany the samples sent to the Society, certifying that they really are the produce of the particular district referred to. The samples should be sufficient in quantity to enable experiments to be made, and an opinion to be formed of their quality. In every instance the maximum extent of the plantation from which the produce has been taken must be stated, with the average yield obtained, and whether similar articles have hitherto been exported from the Colony, or not, and in what quantities.

All communications and articles intended for competition must be delivered to the Secretary, at the Society's house, free of expense, on or before the 31st of March, 1855. This restriction, as to the date of receipt does not apply to those articles of Colonial produce which were not in last year's list.

Any communication, or paper read at an ordinary meeting, will be considered as the property of the Society, unless any previous arrangement has been made to the contrary. But should the Council delay its publication beyond twelve months after the date of reading, the Author will be permitted to take a copy of the same, and to publish it in any way he thinks fit.

Successful candidates will be communicated with on, or before, the 13th of June, 1855. Unrewarded communications and articles must be applied for at the close of the Session, between the 13th of June and the 4th of July, 1855, after which date the Society will no longer be responsible for their return.

P. LE NEVE FOSTER.
Secretary.

SALFORD BOROUGH ROYAL MUSEUM AND LIBRARY.—The sixth report of the executive committee, after alluding to the continued success of the Institution, proceeds to state that, during the past year, a most important addition has been made to it—at the suggestion of Mr. Langworthy—that of a free lending library. This now contains 2,500 volumes, and from the eagerness with which the project is espoused by the public, it bids fair to be one of the most useful adjuncts to the Institution. Large additions have been made to the Museum, both by donations and purchase; and many of the most eminent manufacturers have promised to furnish materials for an Industrial Museum of Practical Art and Manufacture. There has been an addition of casts from the antique; the engravings have been framed, and the geological collection is now being mounted and classified. During the Whitsuntide holidays 44,344 persons passed through the Museum, without any damage or loss being occasioned.

THE EDUCATIONAL EXHIBITION.

Swedish Commissioners Report.

Dr. P. A. Siljeström, Commissioner from Sweden to this Exhibition, has recently made a Report to his Government on the subject.

Having described the Exhibition itself, its *locale*, and arrangement, as well as the principal contributions from different countries, amongst which the Norwegian department is mentioned with great praise, Dr. Siljeström goes on to say:—

"As regards my personal participation in the Exhibition, I have the honour to state the following particulars:—As soon as H.R.M. had graciously ordered me to go to England as a delegate to the Exhibition, I hastened to take such measures as the short time left for preparations warranted for procuring some contributions to the articles to be exhibited. In this way I succeeded in bringing together a quantity of exhibitional articles, sufficient to fill up eleven large packing-cases, exclusive of three separate articles of greater dimensions; and though the collection, in consequence of the very limited time allotted to its preparation, must needs be somewhat desultory, yet it contained not a few materials suitable for throwing light upon the nature of our educational institutions, high as well as low, from the University down to the National School. It gives me great satisfaction to be able to state to the department that various exhibitional articles fron Sweden attracted a great deal of attention. Some school maps of Scandinavia, executed on a new plan of Lieut. Mentzer, and an astronomic globe by the Chaplain Janzon,—to which already some years back a prize medal was awarded by the Swedish Government, though subsequently not applied to any practical use,—met with general and just approbation. A model of our Swedish gymnastics for schools was viewed with great interest; and Dr. Dillner's psalmodicon, improved by Director Mankell, some maps painted on wood, as used in the New Elementary School, a couple of contrivances employed in the education of the deaf and dumb and the blind at Manheim, Director Sillen's tuning-fork, an apparatus in use at Stockholm for suspending diagrams at lectures, &c., were all so many points of attraction. The simple appliance of using natural dried leaves as patterns for drawing, as practised at the School of the Swedish Artificers' Union, likewise enjoyed the attention of connoisseurs. Some specimens of the works executed by Auditor Scheutz's calculating machine, and of the zinc-printing invented by Major Dreyer (by which important invention cheapness will be effected in the manufacture of several educational implements), did also not fail to be noticed with pleasure.

"The works of our school pupils appeared to me not to suffer by a juxta-position with similar contributions from other countries; and it affords me the greatest pleasure to be enabled to speak with particular praise of some excellent specimens of calligraphy, drawings of maps, and other sketching, which had been sent in from several national schools, as well at Stockholm and other towns as in the country. The various samples of needle work, knitting, and spinning, which were contributed from some of our girls' schools presented themselves to great advantage. A set of agricultural models and sundry utensils manufactured by the pupils of the Mechanical School at Flea, in Sudermannia, were well calculated to show the suitability and propriety of keeping up such practice. Several works executed by the pupils of the establishment for the deaf and dumb and the blind, had likewise their share of well-merited notice. Although I did not succeed in collecting from our elementary schools very many contributions to this department of the Exhibition, yet there were to be found some specimens of great value, more especially some drawings of maps, as well as various examples of handwriting and translation. Amongst the latter I must particularly mention a portfolio containing the school-work for a whole year of a pupil of the New Elementary School, being well suited to give an insight into the state and extent of linguistic studies at our elementary establishments for education. The same school has also sent over an herbarium, comprising the quantity of plants ordinarily gathered by a pupil during his school years, proving, in a conspicuous, manner the comparatively important part which botany plays among the several branches of natural science at the Swedish elementary schools. From the commercial shool at Gothenburg there was lying for view a set of pattern-books of book-keeping, in every respect well worthy of being exhibited. Amongst higher girls' schools there was only one—that established by Wallin, at Stockholm—which had furnished pattern-books of book-keeping, composition, and translations into the three most common living languages; while a school at Christiansbad had contributed some drawings, and a couple of schools of the same kind had communicated their plans of teaching. The school of the "Cuttus Circle" at Christiansbad had sent in a great many designs of merit; and on the school of the "Swedish Artificers' Union" must, above all, be bestowed the greatest praise, for its numerous and excellent contributions of free-hand drawings, spherical sketching, constructing designs, paintings, and modelling, which imparted an increased value and enhanced lustre not only to the Swedish department, but to the whole exhibition. I embrace with pleasure this opportunity of stating that the works of this school were considered by competent judges to possess a very great value, and to manifest in the highest degree the superiority of the teaching in the educational establishment from whence such products could have been issued. The school of the Artificers' Union had also brought in specimens of tables and schools for separate pupils; and, as no such were to be found from America, the honour is due to that school of having displayed conspicuously, as it were, before the eyes of Europe, the idea of this advantageous construction of school furniture.

"Attention was also directed to the little library, containing about 400 volumes of teaching and reading books (more recent Swedish originals), which were examined in detail more than could have been expected. Several books were particularly remarked, owing either to the plan on which they had been written, or to the cheap price at which they are in many instances sold.

"I cannot here enter into further details without being too prolix, and it will, therefore, be proper, perhaps, simply to add that, on the day preceding my departure from London I had the satisfaction of receiving from the Council of the "Society of Arts" a flattering communication, the contents of which showed that our Swedish exhibitional articles had not been viewed with indifference. At the same time it is as much a duty as a pleasure for me to testify to the polite and courteous manner in which I, as well as other representatives of foreign countries, was treated by the authorities, who endeavoured to make our stay in England both pleasant and instructive, by gaining for us admittance to all the valuable exhibitions which, during that time, were to be viewed in and near to London; by procuring us opportunities for making many personal acquaintances of great interest, and for obtaining every information we might desire relative to educational matters, &c. I cannot omit mentioning, more particularly, that I had the honour of showing our exhibitional articles to H.R.H. Prince Albert, to the Prince of Wales and Prince Arthur, and to Lord John Russell, as well as to several other distinguished persons.

"It is, likewise, a tribute of due acknowledgment to mention the kind manner in which I was treated and supported in my efforts by her Majesty's envoy at the Royal Court of St. James's, Admiral Virgin, in no less degree than by the Swedish Consul-General Mr. Tottie, and by the rector of the Swedish Congregation in London, the Rev. Dr. Carlson. Nor can I pass over in si-

lence the eminent and indefatigable zeal evinced by Mr. Lindgren, shipping agent, of London, in getting my baggage through the Custom-house, and in managing its conveyance, without which it probably would have been impossible to get the articles arranged in proper time. And finally, I cannot omit expressing my inmost satisfaction at the kindness and assiduous attention which the representative of Norway at the Exhibition, Councillor Nissen, and his assistant, Dr. Krag, displayed in watching over our common interests.

"One of the results attendant on the participation of Sweden and Norway in the Exhibition, which will tend to preserve the memory of this enterprise in the minds of our countrymen in London, has been produced by the circumstance that a great portion of the books which were sent in will remain as a foundation of a library for the Swedish Congregation in London. As a great many of our countrymen visit that great metropolis every year—especially sea captains and sailors, who, often compelled to stay there for weeks and months, are exposed, for want of more suitable recreation during hours of leisure, to all the injurious temptations which a large city is sure to throw in their way—it has been deemed especially apposite, by procuring means for wholesome and useful reading, to keep off as much as possible the said detrimental mental influences, and at the same time make fruitful for their mental development that leisure time which, perhaps, never will return. I rejoice at being able to add that all Swedish publishers to whom I hitherto have had time to speak on the subject, have not only willingly presented those of their works which were sent over for this occasion to London, but likewise promised further contributions to the object in question.

"In conclusion I have the honour to mention that the principal and detailed information which I was able to gain at the Exhibition will be contained in a treatise on the appropriate structure of schoolhouses, school *matériel*, and educational appliances, in writing which I am at present engaged.

"P. A. SILJESTROM.

"Stockholm, 11th September, 1864."

THE FORESTS AND WOODS OF SOUTHERN INDIA.

Surgeon Edward Balfour, the officer in charge of the Government Central Museum, has forwarded to the Secretary the following Memorandum prepared to procure information from the various districts, to enable a report to be made at the end of the current year.

Government Central Museum, College of
Fort St. George, Madras, 1st July, 1864.

Sir,—In my half-yearly Report to Government, for the six months ending 31st December, 1853, I gave a description of the Marbles of Southern India; and, on the 30th of June this year, I was enabled to report fully on its iron ores:* and I have the honour to mention that, trusting to receive from yourself and others interested in developing the resources of this country, a continuance of that assistance which you have hitherto so liberally afforded me, I will endeavour in my Report on the 31st December next, to describe its *Forests* and its *Woods*. I, therefore, solicit you to favour me with any information, in your power to give, regarding the Forests and the Woods of the district you are residing in, the following, points being most deserving of your attention. †

* The two Reports already published as the Records of Government, are to be had at 8 annas each.

† The observations here given are drawn from Colonel Sabine's "What to Observe," the Admiralty Manual, and the Madras Central Committee's proceedings.

Forests.

A subject of the greatest importance in civilized countries is timber, whether it be required for civil or naval construction. It is from the largest trees of extensive forests that we are provided with timber fit for the keels, masts, yards, &c., of vessels, and for the large beams, &c., required in the construction of edifices. We may, however, remark, that very small pieces of wood enter into the construction of ships; but they are for the most part obtained from the bends and branches of large trees. Besides timber, properly so called, there is plank-wood of different dimensions, called deal, and batten-wood, fire-wood, &c.

Almost every country, more or less, can furnish a certain quantity of large timber and smaller wood, both for civil and naval constructions; but some countries produce just what is necessary for their consumption, others have not a sufficiency, and others, again, supply enough for an extensive exportation. The observer will therefore note:—

1. How the country he is considering stands with regard to the quantity of timber it can furnish. 2. In the tabular view of the general distribution of land as regards its quality and productions, the quantity of forest land in each province and in the whole country will be laid down; but other details are here necessary, and we shall state at once all the observations to be made on the forests, though several of the objects, after information upon them is required, may be properly arranged under other heads. 3. What is the name and position of the several forests, and the kind of trees of which they consist. 4. Do they belong to the government or to private individuals?

5. What are the kind of trees which, being indigenous to other countries similarly situated, do not grow in the country under consideration?

6. What are the indigenous forest-trees of all kinds growing in the country, and what exotic trees being introduced, thrive?

7. What are the most common forest-trees of the country?

8. Is the felling of forest-trees subject to any particular regulations; and, if so, what are those regulations? In some countries, the forests, according to the kind of trees, are divided into portions, only one of which can be cleared annually, which portion must be immediately replanted or sown, so as to procure a constant supply of timber. If there are no regulations as to the felling of timber and its reproduction, the consequence will naturally be an eventual failure of the article, in a longer or shorter time, according to its consumption and the extent of the forest. To what extent may the forests have been destroyed, within a given term of years, by this want of system?

9. Are the forests felled exclusively for the sake of the timber, or merely for clearing the ground, and obtaining land for cultivation, as in newly-settled forest-lands?

10. The mode of felling in the one case is careful, and the trees are selected for particular purposes; in the other, the destruction is wholesale, and sometimes effected by fire. The *modus operandi*, in either case, should be carefully noticed, and the time of cutting the different trees to be used in the arts.

11. What is the price of standing timber of different kinds and dimensions; what may be the net annual revenue from a given extent of forests of different kinds; at what age is it customary or most advantageous to fell the different kinds of trees; for what particular purposes are the trees felled; is it for large timber, for sawing into planks, for wheel-wright's and mill work, for cask staves, &c., or for firewood?

12. Is any tar, or pitch, or vegetable black, or charcoal, or potash, or turpentine, &c., prepared in the forest; if so, in what quantities, and of what value, and what are the processes? Are any of the trees stripped of their bark for tanneries, &c.; and if so, what are the kind of trees so stripped, and what amount of bark is annually sold? What is the annual consumption and exportation, if there be any, of these several articles; what is the price on the

spot of a given weight or measure of the several objects enumerated? Is the trade in them subject to any particular regulation, and what?

13. Is there a forest department for regulating everything respecting the forests of the country? How is this department organised, and what is the extent of its attributions?

14. Do the forest laws extend to private forests as well as those of the Government, and are these laws alike for all parts of the country, or are there, in this respect, any privileges belonging to certain places; and if so, what are those places, and what are the immunities or privileges they enjoy? What is the general effect of the forest laws of the country?

15. Do the forests yield any revenue to the state, and what is its amount? Is it derived solely from the sale of timber and other vegetable products of the forest, or from hunts, fisheries, peat-bogs, quarries, &c.? Is any revenue derived from wild honey, from right of pasturage in the forests, from wild fruits, collected either for oil or feeding cattle, &c.?

16. What are the wild or rare animals found in the forests of the country?

17. Besides timber for building and similar purposes, the forests often furnish trees and shrubs of particular kinds used by turners or by joiners for works of marquetry, &c. If they possess in an eminent degree, the requisite qualities of hardness, firmness of grain, tenacity, colour, &c., they form an object which is sometimes of considerable consequence, as is the case with many American fine woods. Where these beautiful woods are known to exist they are turned to account, but in unexplored forests they must be sought for; this latter observation applies equally to all the productions of a country. It is also from the forests and wild places that many of the vegetable productions employed in dyeing and in medicine are obtained. They deserve particular attention, and may as well be mentioned here as elsewhere; though it will be advisable to place the information obtained under the proper heads to which it belongs.

Woods.

The time for felling trees for timber, is said by the natives of this country to be during the wane of the moon, and from the second day after full until the day before new, but it is a prevalent belief in Europe that a tree should be cut down on the fall of its leaf.

In selecting specimens of woods, they should be such as to admit of their being fairly tested as regards their strength and their susceptibility to bear a heavy strain.

The samples should be heart wood, in bars 2½ feet long by about 1½ inch square, to allow of shrinking in drying. "In each case it will be very desirable to know the general size of the tree producing the timber. This will be best ascertained by taking, say ten trees of apparently the average run, and measuring—(1) the average distance from the ground to the lowest branch—(2) the average circumference of the trunk above and clear of the swell of the roots, and—(3) the average circumference below and clear of the insertion of the first branch. (4) It might in some cases be worth while to furnish a rough sketch of the general shape of the stem and ten or twelve feet in length of the principal limbs. The example selected for the sketch should be the tree which will give the best idea of the general growth of the timber. (5) It will be well also to furnish at the same time general observations as to the appearance of the decay in any trees of the species which may have fallen, and may be lying about decaying; also, if the country be inhabited, the local uses to which the timber is put, and the state of any of it which can be ascertained to have been in long use for any purpose which is in its nature trying to the durability of timber—as alternations of exposure to wet and dry.

6. The specimens of wood should have the name of the tree from which they are taken written on the paper in the native character, due care being taken that a name belonging to one language is not written in the characters of another language; and should also bear marks corresponding with those on the sample of timber they belong to, and they are then in a fit state to teach important lessons. A list of woods under merely native names conveys no information, for the same tree is often differently named at different ends of the same jungle. Such a list consequently conveys no information to any person living beyond the contracted limits within which the name is understood. The same name is not unfrequently given to very different trees, but botanical names are universally and invariably the same. Vengy Moorm is a name known in Coimbatore, but beyond that place, is unknown—on the other hand *Pterocarpus Marsupium*, the botanical name, conveys to the botanist a whole volume of information. Kurra murda, being mentioned in Coimbatore, suggests the idea of a dark coloured kind of timber, so strong that an inch bar will bear from 500 to 550 lbs.; and so heavy that it will barely float in water, and at the same time so hard that white ants can make no more impression on it than on iron. The name given to it in Coimbatore however would be no assistance in searching for it in other places, but the botanical names, *Terminalia* or *Pentaqtera* (it has both) at once point it out as one of a family in which these qualities generally exist, and that it is a widely distributed one. But we further learn from the specific name, *Glabra*, that its properties are still unknown to science, as no allusion is made to them in books which treat of the properties of plants. These examples will suffice to illustrate the necessity of ascertaining the botanical names of all the timber trees of which specimens are collected, if we would hope to diffuse information of any value.

Determining the Botanical Name of the Tree.

In forwarding the samples of woods, therefore, if the botanical name of the tree from which they are taken be not known, it is most desirable that means should be afforded to determine that point, and to ascertain the properties of the timber it furnishes.

For this purpose specimens of the leaves, and of the flowers and fruit of the unknown tree (where possible all three) should accompany the samples of its wood.

These should be prepared simply by drying them between sheets of paper, under moderate pressure—the loss of their colour being of no moment. Of specimens so prepared, none of which need exceed eighteen inches 100 or 150, if properly packed, might be sent in an ordinary banghy parcel. Paper of a rather absorbent quality is best suited for this purpose, and pressure is most conveniently made between two boards (the uppermost bearing a heavy weight—superimposed), with a sufficient number of spare sheets of paper placed between each board and the specimen to be dried. The fruit, when mature, will frequently be dry enough to be forwarded without further preparation, but when this cannot be done, and it is too fleshy to be dried between two sheets of paper, it may be sent in alcohol, or in brine, a saturated solution of common salt. These specimens of leaves, flowers, and fruits, should likewise be carefully named, with their native names, in the same manner as above indicated for the woods.

Although seeking from you information on the points above detailed, regarding this country's forests and its woods, I am well aware how greatly your time is occupied with your ordinary duties; but, in the course of my inquiries during the past few years, I have invariably received most information from those whose time is most engaged, and from whom, therefore, the least was to be anticipated. This has been particularly the case with the recent inquiries regarding the iron ores, and iron and steel of Southern India—the seventy-five reports, &c., on which that I have received, having been written by those of our countrymen who are, perhaps, the most severely occupied with their ordinary duties.

I therefore hope that much good will result from this inquiry regarding the forests and the woods, the importance of which to this country's interests you are well aware, for many reasons connected with its trade and its manufactures, is very great.

At present we possess only brief notices of the products of this presidency, and even these are so scattered in numerous books that it would take a long time to discover them, but I hope with your aid to frame such a report on the forests and woods of Southern India, as shall afford a general and useful view of them all.

I should wish to make the report alluded to on the 31st December of this year—but I am well aware of the extent and the difficulties of this inquiry, and, if it be possible to obtain the necessary information by that time, I will then fix the further date of the 30th June, 1855.

In the meantime I beg of you to send whatever information you may be able to collect, however limited you may suppose it to be, as one additional fact often serves as a link to the chain of information already existing, and enables a compiler to complete the whole. With these views, I have the honour to remain, sir,

Your most obedient servant

EDWARD BALFOUR,

In charge of the Government Central Museum.

MEMORANDUM CONCERNING THE ESTABLISHMENT IN PARIS OF AN INDUSTRIAL SCHOOL FOR YOUNG ENGLISHMEN.

During the late Educational Exhibition, Mr. Marguerin, the principal of an important Industrial School in Paris, was sent over by the Prefect of that city to ascertain what might be the practical results of the above Exhibition. I accompanied Mr. Marguerin, and equally with him took advantage of the opportunity to visit some of the English Training Schools in and about London. Both were struck by a twofold deficiency which seemed to pervade those establishments. In the first place, the arts of design are generally conducted upon false principles, which will probably lead to no results proportionate to the expenses incurred for the nurturing of an artistic spirit among the English people. Secondly, in regard to industrial education, there appears to be wanting, between the common primary schools and those of a higher description, which profess to form young men to become civil engineers, mechanics, &c., a series of preparatory instructions that would render much easier the attainment of the latter object. On the contrary, this initiation tuition does exist in France, and more particularly in Paris. The municipal school, known by the name of *Ecole Turgot*, was founded several years ago for that immediate purpose, and the attempt has been hitherto attended with success. This very circumstance disposes both Mr. Marguerin and myself to believe that a similar organisation might likewise be useful to the English youth. Such is the reason which induces me to submit the following reflections to Dr. Playfair, and to his friends of the Society of Arts.

The plan would consist in sending over to Paris a certain number of English boys to go through the regular course of artistic and industrial studies, such as they are organised at the *Ecole Turgot*. According to the results obtained with a small number at first, as a trial, it would be hereafter possible to extend the undertaking upon the same plan. On the other hand, the city corporation of Paris might likewise undertake to send over to London any number of young Frenchmen, who would be in their turn formed to the language, practices, and habits of British commerce and industry, an advantage which both nations would soon appreciate. In the latter case, the expenses attendant upon the execution of this plan would be supported by the Board of Trade for England and by the Parisian municipality for France. The outlay for each boy would not certainly amount to more than 30*l.* or 35*l.* a year.

The course of studies for the English boys would include a period of four years, beginning with boys of twelve years, and ending with those of sixteen years of age. The first year should be more particularly devoted to the acquirement of the French language, both in theory and practice; as also to the learning such arts as drawing and lineal design, which do not require a thorough knowledge of the French tongue.

During the three latter years, the English pupils would attend the lectures and studies of the *Ecole Turgot*, and thus obtain acquirements sufficient to make them fit for any industrial or commercial profession in England. The better to give an idea of what the above studies are, I subjoin here the programme of the school.

1. French, English, and German languages.
2. History and Geography, the latter in its physical, political, and commercial branches.
3. Natural History, including zoology, botany, geology, and mineralogy. These sciences are taught with a special view to their practical application through life.
4. Chemistry, physics, mechanics.
5. Calligraphy, book-keeping, ornamental and geometrical design.
6. Mathematics, including arithmetic, geometry, algebra, with the elements of trigonometry, and descriptive geometry.

The above sciences are likewise taught at the industrial school, in the same practical manner. Particular attention is given, for instance, to mental arithmetic, and so on in the other branches of mathematical science. Chemistry is accompanied by manipulations; physics is grounded upon numerous experiments and machinery.

Ornamental design, free-hand drawing, and from casts, are followed by modelling in *terra cotta* and clay.

Thus, again, geometrical design leads on to architectural drawing and the study of machinery.

Such is a rough sketch of the studies prosecuted at the *Ecole Turgot*. The system is found to work well in France, the pupils being enabled to follow up successfully the numerous branches of industrial art for which that country is so conspicuous. Would it not be attended with the same consequences in England?

For instance, arguing upon this hypothesis, might not our young lads, on returning to their native country, 1. either continue their studies upon a more extensive scale, with a degree of superiority grounded upon their previous acquirements?

2. Or again, might they not be immediately placed in several sorts of manufactures, in the capacity of draughtsmen, pattern-designers, &c.? This is exactly what happens every year to the pupils of the *Ecole Turgot* in France.

3. If the calling of some of these youths were in another line, they would obtain good situations in commercial houses, where their proficiency both in the French language and in accounts would soon be duly appreciated.

Lastly, some of these pupils more particularly distinguished for their talent in drawing, might in their turn become masters in British schools, where they would effectually propagate a sound taste for ornamental design, by grounding it on such principles as have hitherto secured to the French nation a real superiority in matters of taste. In fact, these young men might prove a sort of nursery-school for drawing masters destined to the primary schools of Great Britain.

If the above ideas are considered practicable and useful, it would probably fall to the Board of Trade to carry them into execution. This must lead of course to a detailed sketch of necessary expenses as the first outlay.

I shall conclude by observing that, as the *Ecole Turgot* receives no boarders, it would be requisite to place the English pupils in some neighbouring institution. I should deem it, however, by far preferable to form a distinct establishment governed by an English head-master. In

this way the religious and moral principles of the boys might be better guarded than in a common Paris school, which is but too often a mere matter of interested speculation.

CHARLES F. AUDLEY.

REDUCTION OF POSTAGE TO NEW SOUTH WALES, VICTORIA, AND SOUTH AUSTRALIA.

Since the 1st October, the postage upon letters conveyed, whether by packet or private ship, between the United Kingdom and the following British colonies, viz., New South Wales, Victoria, and South Australia, has been reduced to a combined British and colonial rate of—For a letter not exceeding half an ounce in weight, 6d.; exceeding half an ounce and not exceeding one ounce, 1s.; exceeding one ounce and not exceeding two ounces, 2s.; and so on, increasing one shilling for every ounce or fraction of an ounce. The postage upon these letters may be paid in advance, or they may be forwarded unpaid, at the option of the sender. The foregoing reduction of postage will extend to all letters directed to Van Diemen's Land, which are sent by the Australian mail packets, whether those which go direct to Australia, or those which take the route to Singapore, as well as to all letters to New Zealand, specially addressed "*via* Melbourne" or "*via* Sydney," but upon such letters, both those for New Zealand and those for Van Diemen's Land, the postage must be paid in advance, or the letters cannot be forwarded. To the reduced rate of 6d. a French transit rate of 5d per quarter ounce must be added in the case of all letters for the above-mentioned colonies which may be specially addressed to be sent *via* Marseilles, making the total charge upon such letters, when under a quarter of an ounce in weight, 11d.; when weighing a quarter of an ounce, and under half an ounce, 1s. 4d.; when weighing half an ounce and under three quarters of an ounce, 2s. 3d.; and so on. The correspondence for Western Australia is forwarded as a rule by private ship. Letters for that colony, specially addressed to be transmitted "*via* Singapore," will continue liable to the existing rate of 1s. the half ounce, or, if also directed to be sent "*via* Marseilles," to the existing rate of 1s. 10d. the quarter ounce, but letters for Western Australia, addressed to go by the direct Australian packet will be sent in the mail for Melbourne, and will be liable only to the reduced rate of 6d. In all cases the postage must be pre-paid. Parliamentary Proceedings—the rates of postage now chargeable upon packets containing printed votes and proceedings of the Imperial Parliament, sent through the post to New South Wales have been repealed, and all such packets are forwarded only by the direct packets, and subject to the rates of postage which are levied on printed books sent to that colony, subject to the usual conditions, viz. :—For a packet of Parliamentary proceedings, not exceeding half a pound in weight, 6d.; exceeding half a pound and not exceeding one pound, 1s.; exceeding one pound and not exceeding two pounds, 2s.; exceeding two pounds and not exceeding three pounds, 3s.; beyond which weight no packet can be sent at a reduced rate of postage.

The postage of 6d. now carries a letter from England to the following foreign parts, viz., Accra, Adelaide, Antigua, Bahamas, Baltic (fleet), Barbadoes, Belgium, Bermuda, Black Sea (fleet), Borneo, Bourbon (Isle of), Cape Coast Castle, Canada, Cariacou, Cayenne, Constantinople, Demarara, Denmark, Dominica, Gibraltar, Grenada, Guatemala, Heligoland, Honduras, Hong Kong, Jamaica, Malta, Mauritius, Melbourne, Montserrat, Nevis, New Zealand, New Brunswick, Newfoundland, Nova Scotia, Prince Edward's Island, St. Croix, St. Helena, St. Kitts, St. Lucia, St. Thomas, St. Vincent, Surinam, Sweden, Sydney, Tobago, Tortola, Trinidad, Van Diemen's Land, White Sea (fleet), Wydah. Also the postage of 5d. conveys a letter from the United States to Bremen, and 2½d. from the United States to Australia.

INDIAN SHEEP AND GOATS' WOOL.

The following report from Dr. J. Forbes Royle to Sir J. C. Melvill, Secretary to the Court of Directors of the East India Company, dated East India House, 28th February, 1854, appears in the *Lahore Chronicle Overland Summary* for July 23rd:—

Having had the forty-two specimens of sheep and goats' wool, and the two of silk, forwarded by the India Government from Lahore, examined by those well acquainted with these products, and their value in the markets here, I beg to submit the following report, with the appended tabular statement. In this I have arranged these wools according to their nature and the places from whence they have been sent.

Mr. Southey, so well known for the attention which he has for so many years paid to colonial wools, has long been anxious about the wools imported of late years from Bombay, and which he has said would come largely into consumption, and sell at fair prices, if they were sent in a clean state to market, especially if the long hairs were first picked out.

Of the specimens sent the goats' wool, or hair, the produce of Tibet, which is so much valued for the manufacture of Kashmeer shawls, is less esteemed here in the state in which it is sent, because long hairs are mixed with the fine wool, so that it cannot be worked in the machinery in use until the hairs have been first picked out: this, in England, is an expensive operation. It is probable, however, that if these hairs were picked out in India, where labour is so much cheaper, the Tibet wool might sell at remunerating prices, as it has frequently been inquired after by those engaged in the manufacture of fine shawls.

The black wool of the Punjab, as well as of the Umbala district, which is so much used in North-West India for making blankets, is not much esteemed here, as there is prejudice against black wools. But the Goojerat, No. 12 wools, being long in staple, would be useful for combing purposes, and might sell at remunerating prices; and that from Simla is of fine quality.

The wools placed under the head of *Mixed*, have been sent as white or black, but are mostly mixed. They are little approved of, and would probably not be much in demand; some of them Messrs. Southey have not priced, as being unsaleable.

The white wools from the district of Simla and other parts of the Himalayas, are, on the contrary, thought so well of, that there can be no doubt of their being largely consumed in this country, if they were sent to market. They are pronounced to be of good quality, and English in character, probably from the similarity of the Himalayan to an European climate. These wools are valued at from nine pence to thirteen pence a pound, and would probably sell at higher prices, if sent in a cleaner state to market.

The white wools from the Punjab, are, like those from the Himalayas, of a kind suited to the English market; but as they are generally mixed with long hairs, they are not priced so high as they otherwise would be, the better kinds ranging from seven pence to ten and a half pence, but if the hairs, dirt, &c., with which most of them are intermixed, could be picked out, where labour is so much cheaper, the value of the wools would be considerably increased. The wools, like those from the Himalayas, are pronounced to be of a very useful quality, and that there is no doubt large quantities would find a ready sale, and probably at higher prices than those quoted, if sent in a clean state.

The two specimens of silk which have been sent as the produce of Saindpore, near Rawul Pindee, have been examined by Messrs. Durant, the celebrated silk brokers. They pronounce the silk to be of a good quality and strong, and apparently obtained from a strong healthy cocoon. The reeling, however, is extremely defective in many respects, besides being about two feet too short. The uncleaned silk has what is called a *crapey* appearance, either from want of tension when reeling, or from too

great a heat in the water employed; such defects can, however, be easily remedied, where a good material is to be operated upon.

As the demand in the Punjab for Raw Silk is considerable, it is imported from Bokhara, as well as from China, and from Bengal, though the first is much preferred to the others. Attempts have lately been made to cultivate silk in the Punjab, and the experiments were proceeding favourably, though I should fear that the great heat and dryness of the climate in the plains would create considerable difficulties. At least in remarking on the fact that silk culture in China is most flourishing in 33 degrees of north latitude, while in India it does not extend between 26 degrees of latitude, it appeared to me that this was owing to the plains of North-west India being much hotter and drier than those of Bengal. In Mysore, again, where there is a favourable climate from the elevation and the influence of the two monsoons, silk culture has, for some time, been proceeding favourably; and some very excellent specimens were sent from thence to the Exhibition of 1851. I believe that the culture would succeed well in the same districts where tea is now being so successfully cultivated, that is in the Kote-Kangra district, or in other similar localities. Besides a favourable climate, there is an abundant and unoccupied population for whom all difficulties might be obviated by obtaining the assistance of a few skilled natives from the silk filatures of Bengal.*

I think it would be useful if one or two moderate-priced works were sent to the Agricultural Society of Lahore, such as Southey on Colonial wools, and Blacklock on sheep; also my Productive Resources of India, as both the silk and wool experiments have been treated of, as well as the subject of pasture grasses.

The yellow dye, called *Iklbeer*, which is, I believe, the produce of a Himalayan plant called *Datisca cannabina*, has been put into the hands of skilful dyers, who are making experiments on other Indian dyes, and will be afterwards reported upon. But as yellow dyes are abundant and cheap, there is less probability of a new one being required, unless it is found to possess some remarkable property.

Report on some wools and silks sent from Lahore, with observations, and probable value in the English market, by Messrs. Southey.

1.—Thibet wools, 1st sort, white, not in demand in English markets, and of little value.

2.—Thibet wools, 2nd sort, white, ditto.

3.—Ditto, 2nd sort, black (rather brown), ditto.

10.—Pushm of Bokhara, 65 rupees per maund, brought by way of Peshawur—goats' wool not in general demand, but clean varieties might sell for 2s. to 3s. per pound.

19.—Black pushm, 1st sort, 1 rupee 4 anas per seer. These are all stated to be not in general demand. They are also objected to as being intermixed with long hairs. If these were picked out, some of the white kinds might be saleable, but the black kinds only at very low prices.

20—Black pushm, 2nd sort, 1 rupee per seer, ditto.

21.—Ditto, 3rd sort, 12 annas per seer, ditto.

22.—White pushm, 2nd sort, 2 rupees per seer, ditto.

23.—Ditto, 3rd sort, 2 rupees per seer, ditto.

SHEEP'S WOOL—HIMALAYAS.

9.—White lambs' wool from Simla—good quality, 11d.; good long, 13d.; but, if picked clean, both would sell higher.

24.—White wool, 1st sort, Simla district, 2 rupees for 2½ seers, ditto.

32.—White wool, Spiti, within the Himalayas—good, but rather wanting of English character, 10d. to 11d.

39.—White wool, Jung, yellow—of good quality, 9d.

SHEEP'S WOOL—PUNJAB AND UMBALA DISTRICTS.

5.—White Punjabee, 1st sort, Lahore 10 rupees per maund—white yellowish, rather Kempey, *i.e.*, with long hairs intermixed, 3d.

7.—Ditto, ditto, Ferozepore—Kempey, yellowish, but a useful kind, 7d.

14.—Ditto ditto, coarse yellow, full of hairs, 6d.

17.—Ditto ditto—9d.

12.—Ditto, Goojrat, white long—9½d to 10d.

15.—Ditto, 2nd sort, Lahore, 8 rupees 8 anas per maund—fair white, 10d.

16.—White wool, Jelum—rather kempey, 7d.

29.—White wool, Kalooal, in Shahpore—rather kempey and yellowish, 7½d. to 8d.

36.—White wool, Choran in Lahore—very good quality, yellow, free from kemps, 10d. to 10½d.

38.—White Punjabee, 1st sort, Kusoor, 10 rupees per maund—good yellow, if white, 10d. to 11d.

41.—White clean, Goojrat—coarse kempey, carded white, mixed with gray hairs, 5½d. to 6d.

42.—White uncleaned Goojrat—fair quality, very short and yellow, 5d. to 6½d.

MIXED WOOLS—PUNJAB AND UMBALA DISTRICTS.

8.—White wool (mixed), Thuneysur—short mixed white and black, 6d. to 7d.

28.—White wool (gray), Jagadree, in Umbala—1 rupee for 4 seers, or 3d. per pound—grey, 3d. to 3½d.

30.—Ditto (mixed), Sahowal in Shahpore—mixed black and yellow.

31.—Black wool, Behra, in Shahpore—mixed black and yellow.

34.—Mixed Punjabee, Kusoor, in Lahore, 10 rupees per maund—fawn, 5½d. to 6d.

BLACK WOOLS—PUNJAB AND UMBALA DISTRICTS, ONE FROM SIMLA.

25.—Black wool, Simla, 1 rupee for 3 seers, or 4d. per lb.—7d.

4.—Black wool, Loodeeana,—fair black,—4½d. to 5d.

6 and 13.—Black wool, Tanseur,—fair black, 4½d.

11.—Black wool, Jelum,—short black, 4d. to 4½d.

12 and 37.—Black wool, Goojrat,—black long, useful, 5½d. to 6d.

18.—Black wool, Jagadaree, in Umbala,—short black, 3d. to 3½d.

27.—Black wool, Jagadaree, in Umbala,—short dark-brown, 4d.

26.—Black Punjabee, Lahore, Kusoor, 6 rupees 8 annas per maund,—fair black, 4½d.

35.—Black Punjabee, Kusoor, 6 rupees 10 annas per maund,—very short, black, 3d. to 3½d.

37.—Black clean, Goojrat,—fair quality, short, 4d. to 4½d.

40.—Black uncleaned, Goojrat,—fair quality, short, 3½d. to 4d.

THE STAPLES OF THE GOOJRANWALA DISTRICT.

From P. Melvill, Esq., C.S., Secretary to the Chief Commissioner of the Punjab, dated Lahore, 6th July, 1854, forwarding a communication from C. Raikes, Esq., C. S., Commissioner of Lahore, to himself, dated Lahore, 24th June, enclosing a report from Major J. Clarke, Deputy Commissioner, Goojranwala, dated 14th June, 1854:—

SIR,—In continuation of my letter, No. 285, dated 12th October, 1853, and with reference to the correspondence,* I have now the honour to submit some remarks on the staples of this district, and its commerce.

* This is exactly the plan which has been followed by the Agricultural Society of Lahore under the auspices of Government.—*H. C.*—*Sec.*

* 1. Commissioner's docket No. 169, dated 27th September, 1853, to the Deputy Commissioner of Goojranwala.

2. Circular No. 13, and letter No. 1,339, dated 22nd September, 1853, from Secretary to the Chief Commissioner, to the Commissioner and Superintendent, Lahore Division.

3. Letter No. —, dated 13th September, 1853, from Secretary to Agri-Horticultural Society, to the Secretary to the Chief Commissioner. Regarding the staples of the districts.

GOOJRANWALA.

Cotton.—Up to about fifteen years ago, about 5,000 maunds of cleaned cotton were annually exported to Jumoo; but that export has ceased, and about 3,000 rupees worth of dhootees were thereafter made, and sold at Lahore and Umritsur; now they find a readier sale towards Peshawur, Rawul Pindee, and Jelum.

Goor.—About twenty years ago, 20,000 maunds of goor were annually exported to Jung, whence sujee, majeet, and mae were received in exchange; but this trade has now declined, fine sugar for consumption here, is imported from Umritsur and Naee-kee-kote.

Wool.—A considerable number of blankets were formerly made and exported to Jumoo; now the wool is sent to Mooltan to the extent of about 3,000 rupees per annum.

Wheat.—None exported; the surplus formerly went to Lahore.

Miscellaneous.—About 5,000 rupees worth of brass, copper, and iron vessels, made for export to Bahawulpoor, Mooltan, Rawul Pindee and Atok; gold and silver ornaments made at Goojranwala are in good esteem.

Indigo, &c.—Indigo is imported from Mooltan, hemp from Jumoo, teel and sursoon from Jelum.

Spices, until lately, were all supplied *via* Umritsur: now a small quantity come from Mooltan, and the profit on them has decreased.

RAMNUGUR.

Wheat.—None exported; in very dry years some imports from Goojrat and Haiderabad.

Wool.—Some wool imported for blankets from Jung and Chuneeoute.

Hemp.—Imported from Seealkote.

Cotton.—Produce scanty, some imports from Umritsur; coarse cloth made and sent to Jung and Chuneeoute.

Goor.—Quantity made small, imports from Zuferwal and Kila Soba Sing, go on to Jung; sugar-candy imported from Umritsur.

Miscellaneous.—Huldee from Jumoo, ginger, hemp, aoula, buhera, cassia frestula, and bed-stead pieces from Bimber, exported to Mooltan *via* the Chenab.

HAFIZABAD.

Wheat.—A small quantity of wheat exported to Shekhoopoora.

Wool.—Surplus wool sent to Mooltan.

Hemp, Cotton, Cane.—Neither hemp, cotton, nor sugar-cane grown in large quantities; some goor sent to Jung, as also some coarse cotton.

Ghee.—Ghee in considerable quantities exported to Lahore; oil imported from Lahore and Umritsur.

SHEKHOOPOORA.

Wheat.—Some wheat imported from Goojrat and Kila Soba Sing; a small quantity occasionally exported to Lahore.

Wool.—About 600 maunds, exported to Lahore.

Linseed.—Small exports occasionally, ditto of ujwain, red-pepper, and post.

Cotton.—"Two kinds grown," "Khoornee" and the other "Bagur," of which the latter is the best; its pods are much larger; some exports of coarse cotton cloth to Pind Dadun Khan, and Meeanee; in scarce years, cotton imported from Marwar.

Sugar.—Goor and shukur chiefly made, and in good years exported to Jung and Sahewell.

WUZEERABAD.

Wheat.—Wheat is sometimes brought from Goojrat, Butala, Umritsur, and Pusroor, but usually the growth is sufficient for the consumption.

Wool.—None exported.

Miscellaneous.—Cocoanuts, pepper, dates, and ginger imported from Boree Bukur and from Umritsur.

Hemp.—Imported from Jumoo.

Cotton.—Not exported; indeed some is imported from Goojrat occasionally, but a coarse cloth, known as "Kuhdur," is much exported to Peshawur: this cloth used in former days, when large bodies of troops were at Lahore, to be sold there.

Sugar.—Sugar-cane not grown in large quantities; imports of goor from Seealkote, Kila Soba Sing, Pusroor, Goordaspore and Umritsur, sent on to Boree Bukur.

Ghee.—Imported from Goojrat, Rajoree, and Poonch, but in consequence of the Hill ghee being brought down in goat skins, its flavour is injured, and it sells at a lower rate.

Mujeet, &c.—Mujeet, alum, and sujee imported from Bunoo Tak.

Indigo.—Indigo from Mooltan and Hindostan.

Post, Opium.—Post is imported from Goojrat, and Opium from Joala Mookee, Bhadeewal, and Chawrian, zila Shahpoor.

Timber.—Pine timber of sorts is rafted on the Chenab from Aknoor in considerable quantities.

The decayed town of Sodra has a mahula occupied by Kukezaees, who bring down large numbers of ready made ploughs from Aknoor, Bimbur, and Meerpoor; these ploughs are made of "khyr," and at the large fair of Dhokul held in June, most agriculturists go over to Sodra and buy their ploughs; whence they carry them home, often to a distance of 30 kos.

EMINABAD.

Sends some coarse cotton cloth to Pind, Dadun, Khan, and Peshawur.

Iron for agricultural implements is imported from Kalabagh, Kuloo, Rajaoree; sheets—iron from Umritsur.

I beg to annex an average price current of some articles made on the past fifteen years.

A considerable trade in saltpetre for export to Bombay is growing up near the line of the Chenab river, towards Pindee Bhuteean.

AVERAGE PRICE CURRENT, FROM SUMBUT 1896 TO SUMBUT 1910.

Goojranwala, wheat, 31 seers; barley, 1 maund, 10 seers, 4 chitaks; gojee, 37 seers, 6 chitaks; goor, 17 seers, 12 chitaks; cotton or kupah, 15 seers, 12 chitaks; sugar or shukur, 16 seers; gram, 32 seers; misree, 2 seers, 12 chitaks; sun, 12 seers; wool, 6 seers.

Ramnugur, wheat, 35 seers; barley, 1 maund, 12 seers, 4 chitaks; gojee, 1 maund 3 seers, 8 chitaks; goor, 15 seers, 12 chitaks; cotton or kupah, 17 seers 4 chitaks; sugar or shukur, 13 seers, 4 chitaks; misree, 3 seers 8 chitaks; wool, 6 seers, 11 chitaks.

Hafizabad, wheat, 33 seers, 6 chitaks; barley, 1 maund, 10 seers, 6 chitaks; gojee, 1 maund, 9 chitaks; goor, 16 seers. 11 chitaks; cotton or kupah, 16 seers, 12 chitaks; sugar or shukur, 13 seers, 10 chitaks; misree, 3 seers, 9 chitaks; sun, 13 seers, 13 chitaks; wool, 8 seers, 12 chitaks.

Wuzeerabad, wheat, 36 seers, 12 chitaks; barley, 1 maund, 9 seers, 5 chitaks; gojee, 1 maund, 3 seers, 12 chitaks; goor, 16 seers, 14 chitaks; cotton or kupah, 17 seers, 6 chitaks; sugar or shukur, 13 seers, 6 chitaks; misree, 2 seers, 15 chitaks; sun, 16 seers, 14 chitaks; wool, 4 seers, 12 chitaks.

N.B.—The above average is calculated on the seer of 80 tolas.

Home Correspondence.

MR. THWAITES'S CYPHER.

22, Blenheim-street, Newcastle-on-Tyne, October 6th, 1854.

SIR,—I beg to inform you that the ingenious method of secret writing which Mr. Thwaites, of Bristol, has discovered, was *first* invented by Bishop Wilkins, more than half-a-century ago.

Two years since a gentleman in Cambridge lent me a work, of which the following is the title:—"The Mathematical and Philosophical Works of the Right Reverend

John Wilkins, late Lord Bishop of Chester; to which is prefixed the Author's Life, and an Account of his Works. In Two Volumes. London: 1802."

The learned bishop gives the method of secret writing alluded to at page 29 of volume II. of the above-mentioned work; where he arranges ten alphabets to the key-word "Prudentia" just as Mr. Thwaites does to the word "Telegraph." The only difference I can see between the two expositions of the method is this: the bishop allows us to proceed from one letter of the key-word to the next in three or four different ways, namely:—

I. At the beginning of a sentence.
II. At the beginning of a line.
III. At the beginning of a word.
IV At every letter.

Whereas, Mr. Thwaites only admits of the last manner of proceeding. Mr. Thwaites justly observes that the method is capable of almost endless variety; I think, however, that the following deserves to be taken notice of: the alphabets may be arranged in three ways equally eligible, so as to spell the key-word, namely,—

The key word may be placed—

I. Horizontally (or vertically).
II. Slanting upwards.
III. Slanting downwards.

Thus, if *land* be the key-word, we may arrange in the three following ways.

I.

L	A	N	D
m	b	o	e
n	c	p	f
&c.,	&c.,	&c..	&c.

II.

i	y	m	D
j	z	N	e
k	A	o	f
L	b	p	g

III.

a	L	z	l	a
b	m	A	m	b
c	n	b	N	c
d	o	c	o	D

In my opinion it is a better plan to pass from each alphabet to the next, than it is to pass from the *same* fixed alphabet to others in succession.

Thus, taking the third arrangement of the alphabets to the key-word "land;" it seems much easier to replace the word "blame" by m z m b p, than by m k l m p.

The insertion of this letter in the next number of the Journal of the Society will greatly oblige,

Sir,
Your obedient servant,
J. B. KEARNEY, M.A.,
Curate of St. John's.

ECONOMY OF FUEL; CONSUMPTION OF SMOKE IN DOMESTIC FUEL GRATES.

Sir,—Now that winter is approaching, the subject of the economy of fuel for household purposes may obtain better attention, and I beg leave to submit the following account of a trial of Dr. N. Arnott's open fire grate, given to me by Dr. R. J. Mann, a very competent observer.

I would suggest that it would be useful if other disinterested observers would similarly communicate the results of their experience of variations in the application of the principle of the grate.

I am, sir, your very obedient servant,
EDWIN CHADWICK.

Burgh Hall, Aylsham, July 3.

Dear Sir,—I hasten to reply to your communication regarding Dr. Arnott's open grate.

I only used the grate eight or ten days before I left Ventnor, but during that time was able to form a very satisfactory opinion on some points connected with it.

The one fact that struck me most upon adopting it was the perfect command it gave me over a very "draughty" room. Previously I had not been able to make the room comfortable on account of the very determined ingress of cold air whenever there was any great amount of atmospheric movement externally to the house. I had at length temporised by nearly hermetically sealing the doors, windows, and floor, narrowing the throat of the chimney to cause very sharp draught, and then introducing through ventilating openings in the cornice just what air was wanted for the occasion; still, whenever the door of the room was opened for a minute, my fire became a furnace. With Dr. Arnott's grate I am able to leave the inlet of cold air, even on windy days, perfectly uncared for. By closing the damper of the chimney I can effectually get rid of all hazardous and disagreeable draughts. The entrance of cold draughts into a room where a fire is burning is intimately connected with the escape of the heated air by the chimney, and is proportioned to it. Economy in the one matter is a safeguard in the other.

Upon one occasion about ten pounds of fuel burned seven hours, without being touched otherwise than by twice adjusting the incandescent coal by the poker's point. I then left it at one a.m., with a bright fire still burning, and at nine the next morning found the grate still hot to the hand. This was in a room where in the old grate I had found about thirty-eight pounds of fuel was ordinarily consumed between nine in the morning and twelve at night (*i.e.*, fifteen hours). The saving of the new grate over the old one in the mere matter of consumption was, therefore, certainly more than one-half.

In the matter of temperature produced I found that a room I previously sat one yard from the fire in to be comfortably warm, I sat four yards from the fire in with the same feeling. I was more struck with the fact of generally diffused warmth than of increased temperature. While having the old grate I was constantly attracted towards the fire—with the new one I was constantly driven away to more distant parts of the room. I found it a very easy thing to raise the thermometer on the carpet, at five feet from the fire, to 74°. I had never tried the thermometer in the same way with the old grate, but I am convinced that I could not have attained anything like the same result.

Upon the question of soot in the room and on the lines, I am not able at present to make any remark. My trial has hitherto been too confined in matter of time to enable me to have formed any safe opinion; but at some future time I shall be prepared to tell you more concerning this.

I had the grate made by an ordinary ironmonger, and without any ornament. The cost was 35s.; the bricklayer's bill for fixing was 19s. Several together might be made for an average of considerably less than 35s.

I find the consumption of smoke to be very nearly complete. I do not doubt that by means of a very narrow aperture to the chimney, and very sharp draught, it may be made quite complete.

You will thus find that I practically attain several objects by the use of this grate:—

1st. The avoidance of cold draught in the room.

2nd. The diffusion of heat throughout the apartment.

3rd. The pressure of a higher temperature than I could before produce.

4th. The saving of more than one-half in fuel, even while producing this.

5th. The absence of any regurgitation of smoke during gusty winds (a very frequent source of annoyance at Ventnor). At some future time I shall hope to be able to send you more precise results; in the meantime,

Believe me, very truly yours,
(Signed) ROBERT JAMES MANN.

PATENT SPECIFICATIONS.

Sir,—The Commissioners of Patents being authorised to publish all specifications of patents, with their illustrative diagrams, &c., they are so doing at a cost to the country perhaps of £15,000 per annum, and there is no doubt but that a wide distribution of these publications would greatly tend to excite the inventive faculties of the people.

But unfortunately these publications do not sell beyond

a very small quantity; in the majority of cases some dozen copies only are purchased, so that, practically speaking, there is no money return for the above outlay.

The want of sale produces another evil—huge warehouses will have to be found to hold the prodigious stock of printed papers that must accumulate, as now, even, 250 copies of every specification, together with its illustrations, is printed (500 was the number until lately). I believe that in a few years Lincoln's Inn Fields will hardly hold the mass that will then exist, unless some remedy be found for the evil.

The butter-shop is, I believe, the accredited outlet for official papers; but in this case I would suggest a better channel for getting these valuable publications before the public.

I would propose, then, that a copy of each specification should be sent to every Institution in Union with the Society of Arts. By this means every patented invention would be brought before the intelligent portion of the public all over the United Kingdom, the description of the invention in the specification and the accompanying diagrams giving the novelty as it were in a substantial form; and this distribution would, I submit, be the means of arousing the imaginative powers of thousands, and so accelerate greatly the progress of improvement in all things.

My project would entail no expense upon the public beyond postage; a sufficient quantity of each specification is always produced for the purpose, and the expense of producing them will be persevered in whether the butter shops or the Institutions in Union become the recipients.

I have the honour to be your most obedient servant,

WILLIAM DAY,

Day and Son, Lithographers to the Queen.

17, Gate-street, Lincoln's Inn Fields,
October 12th, 1854.

SEWAGE MANURE.

SIR,—The extracts from the report of Mr. Wicksteed, on Sewage Manure, circulated last week with the authority of the *Journal of the Society of Arts*, are calculated to convey so erroneous a notion of the value of that article, and thence so seriously to impede the progress of sanitary drainage in our large towns, that I cannot refrain making some comments upon them.

I differ entirely from Mr. Wicksteed, Mr. Chadwick, and all other gentlemen who have printed so much on the value of sewage manure. The experience of the last ten years, the failure of some score patents, and the loss of capital by companies and by private individuals, have proved that, except in rare and exceptional instances, sewage manure has no commercial value whatever, and that it is the interest of towns to get rid of their sewage as fast and as far as possible, without waiting for the often promised and never performed contrivance which is to turn liquid refuse into solid cash.

The time has past for experiments in wine glasses or even in flannel bags. The demand for a powerful concentrated manure among our agriculturists is practically limitless, and the man who can afford to produce a portable manure half as efficient as guano at £3 3s. a ton will have more customers than he can supply. I say that confidently, from an intimate acquaintance with the farmers of all the best root-growing countries in England.

The farmers of the present day, however obstinate they may be on political questions, are wide awake to everything in the shape of real agricultural improvement. If proof be needed it is only necessary to turn to the steady demand for Peruvian and Bolivian guano, for superphosphate, for Lawes' patent manure, and other portable manures of *proved* value. But, as to town sewage, all who take any interest in agriculture are quite sick of the way in which, year after year, some new scheme for turning town sewage into cakes, as fertilising as guano, is introduced, in speeches and letters to newspapers, in which the non-agricultural public are informed that the waste of valuable town sewage is only owing to the stupidity of farmers. But each scheme, after a short flare up, expires, leaving behind an abominable smell at the works, and a lawyer's and engineer's bill at the offices.

Pray understand, I do not assert that nothing profitable will ever be made of town sewage, but that nothing has up to the present moment; and that, as the manufacture of artificial manures is an established trade, towns will do well to leave such undertakings to private enterprise, and be content to get rid of their poison-breeding refuse, without seeking a profit from it.

When some manufacturer can deliver the products of town sewage, not in ounces, but in tons, and find a market for it, it will be time enough to talk of spending a million sterling in establishing a manure manufactory. Mr. Wicksteed wisely and summarily discusses the liquid sewage distribution scheme. The idea of distributing daily a hundred million gallons of sewage water over farms round the metropolis, where, for half the year, it would do harm, and for the other half—so diluted are its qualities—very little good, is simply absurd. But then Mr. Wicksteed has taken out a patent, and formed, in 1851, a Patent Solid Sewage Manure Company, and, although he has been unable to complete works at an estimated cost of £25,000, he "is satisfied that the scheme is not only practicable, but remunerative." Of course he is. Was there ever a patentee who was not satisfied with his patent?

To me it seems perfectly ridiculous to call on a patentee for a report on what verbally amounts to—the propriety of carrying out his own patent.

Now as to Mr. Wicksteed's process, which seems as least as good, if not better, than any other proposed for solidifying sewage manure.

He deodorises the sewage with lime, strains off the solid matter, dries it by a centrifugal machine; and then it contains sixty per cent. of moisture, which, by a few weeks' exposure to the air, he hopes to reduce to twenty per cent., when it is to be packed in casks, and sent over the country for sale.

The report is evidently premature; at present some bricks of solid sewage have been made; no one doubts that that can be done, but as to the fertilizing qualities we have no evidence, and until some eminent Lincolnshire, or Nottinghamshire, or Norfolk farmer has tried not a hundred weight but a ton, any report from the patentee is a mere advertising puff

But it so happens, that the last part of the Journal of the Royal Agricultural Society contains an elaborate examination of the value of town Sewage, by Mr. Way, the consulting chemist of the Society, who comes, on detailed evidence, to conclusions quite contrary to those of Mr. Wicksteed. To that article I refer those readers of the Journal anxious to see a series of analyses of the value of town sewage.

Mr. Way proves that the principal parts of the matters important to vegetation, the ammonia, the phosphoric acid, and the alkaline salts, are washed out of the solid sewage by the water in which it is held in suspension; and further, that solid sewage collected at the mouth of the Croydon sewer contained less than four per cent. of ammonia.

As to the use of lime as a deodoriser, that may be admitted, but Mr. Way shows that the value of organic matters of value to agriculture, precipitated by lime, is very small and more than counterbalanced by the addition of from 40 to 60 per cent. of a totally useless matter—carbonate of lime.

It is certainly not worth the while of town corporations to lay out a shilling to produce an article worth only tenpence, or of our farmers to buy an article low in price and dear in quality, an article very inferior to the night soil which market gardeners fetch back without expense in their empty carts.

Let us then leave the problem of the commercial value of sewage manure to be solved by chemists and capital-

ists, and let our Local Boards of Health be content "to use existing processes to remove refuse matter without polluting the neighbouring streams," treating the manure as a secondary consideration, to be sold or given away, but at any rate to be removed from situations where it is likely to become a dangerous nuisance.

I am, &c.,

S. S.

Farmers' Club, Blackfriars, 13th October, 1854.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Oct. 13th*, 1854.]

Dated 16th August, 1854.

1788. W. Burgess, Newgate street—Reaping machines.

Dated 30th August, 1854.

1897. B. Meyers, 25, Savage gardens, Tower hill.—Walking-stick guns. (A communication.)

Dated 6th September, 1854.

1947. J. Westwood and R. Baillie, Poplar—Preventing corrosion in iron ships.

Dated 18th September, 1854.

2011. W. Simpson, Birmingham—Girders for bridges.
2013. N. Thompson, jun., New York—Life-preserving seats.
2015. W. E. Newton, 66, Chancery lane—Tuning keys. (A communication.)
2017. S. Crabtree, Bradford—Combing fibrous substances.

Dated 19th September, 1854.

2019. W. H. Dawes, Handsworth—Iron.
2021. J. Cunningham, Beith, N.B.—Printing surfaces.
2023. J. Kershaw, Bury—Looms.

Dated 20th September, 1854.

2025. W. Gee, Birmingham—Braces for boring, &c., screws, &c.
2027. J. Robinson, Huddersfield—Generating steam and gas, and consuming smoke.
2029. V. A. Pierret, Old Compton street, Soho—Watches and clocks.
2031. J. B. E. Savary and J. F. Hazard, Paris—Pumps.
2033. A. E. L. Bellford, 16, Castle street, Holborn—Washing paper stock. (A communication.)
2036. A. E. L. Bellford, 16, Castle street, Holborn—Sewing machines. (A communication.)

Dated 21st September, 1854.

2037. H. Hudson, South Shields—Vessels for measuring fluids.
2039. J. A. Passet, Paris—Calendering fabrics.
2041. W. Hodson, Hull—Bricks, tiles, &c.

Dated 22nd September, 1854.

2042. W. Crofts, Nottingham park—Fringes.
2043. J. E. A. Gwynne, Essex street, Strand—Machinery for lifting, forcing, and exhausting.
2044. J. H. Johnson, 47, Lincoln's inn fields—Manufacturing cards for preparation of fibrous materials. (A communication.)
2045. H. Holland, Birmingham—Umbrellas and parasols.
2046. T. Lawrence, Birmingham—Bayonets.
2047. P. Spence, Pendleton—Sulphur from iron pyrites.
2048. G. Collier, Halifax, and S. Thornton, Rochdale—Looms.
2049. W. J. Brown, Bristol—Sizing yarns.

Dated 23rd September, 1854.

2050. T. Garnett, Liverpool—Steam-engine governors.
2051. P. Feloj, 183, Fleet street—Knife and fork.
2052. T. Banks, Derby, and H. Banks, Wednesbury—Stopping railway trains.
2053. S. E. Hoskins, M.D., F.R.S., Guernsey—Paper.
2054. J. H. Johnson, 47, Lincoln's inn fields—Generation of steam. (A communication.)
2055. R. Pinkney, 26, Long Acre—Stoppers, corks, &c.
2056. G. MacNaught, Glasgow—Saddletrees.
2057. G. Danré, Marseilles—Gas burners.
2058. H. A. Genetrean, Paris—Carriage shafts, poles, or beams.

Dated 25th September, 1854.

2059. W. Marshall, Wachinghem, Pas de Calais—Railway wheels.
2060. R. McConnel, Glasgow—Locks.
2061. P. J. Chabot, Spitalfields—Supplying air to furnaces.
2062. H. H. Bigg, Leicester square—Apparatus for curing deformities of human frame.
2063. H. C. O. de Ruolz, and A. L. M. de Fontenay, Paris—Metallic alloy.
2064. W. P. Surgey, Hackney—Cigars, cigarettes, and cheroots.

Dated 26th September, 1854.

2065. J. B. Halsey, 4, Norfolk street, Strand—Crushing and pulverizing ores and separating gold.
2066. L. Cornides, 4, Trafalgar square—Transparent medium of gelatine, &c.
2067. J. Boulton, 1, Coppice row, Clerkenwell—Dry gasmeters.
2068. G. Spencer, 3, Alpha road, New Cross—External covering of roofs and walls.
2069. W. F. Sadler, 96, Tooley street—Using up smoke of furnaces.
2070. T. Clayton and R. Harrop, Oldham—Ornamenting wood.
2071. Lord Berriedale, 17, Hill street—Ornamenting paper.

Dated 27th September, 1854.

2073. J. S. Holland, Woolwich—Fire-arms.
2074. W. K. McMinn, Liverpool—Double acting anchor purchase.
2075. C. Barraclough, Halifax—Clog and patten soles.
2076. J. Edge, Bolton-le-Moors—Pistons.
2077. J. Chambers, Manchester—Washing fabrics.
2078. R. Hoyle, Bury—Preventing incrustation in boilers.
2079. R. Renfrew, Glasgow—Bobbins.

Dated 28th September, 1854.

2080. F. Clark, King street, Westminster—Spindle and bush for doors.
2081. A. Y. Crosse, Blackheath—Buttons.
2082. J. Rogerson and J. Brimelow, Bolton—Steam engines.
2083. J. Simpson, Rochdale—Printer's blankets.
2084. A. V. Newton, 66, Chancery lane—Rigging sailing vessels. (A communication.)
2085. W. Hutchinson and W. Barlow, Salford—Steam boilers.
2086. W. B. Johnson, Manchester—Lamps.
2087. G. Crux, Manchester—Bonnets, children's hats, &c.
2088. J. Woodward, Barnet—Stopping shot holes in ships.
2089. C. W. Lancaster, New Bond street—Fire-arms and cartridges.
2090. M. Poole, Avenue road, Regent's park—Cylinder paper machines. (A communication.)
2091. L. Beer, Elbœuf—Shearing piled fabrics.

Dated 29th September, 1854.

2092. T. F. Griffiths, Birmingham—Lamps.
2093. T. Mohan, Aclint, Louth—Churn.
2094. W. Smeath, Nottingham—Sewing machines.
2095. J. N. Gamewell, Camden Kersham District, S. Carolina—Relieving wires of electric telegraph of atmospheric electricity.
2096. J. H. Johnson, 47, Lincoln's inn fields—Removing points from hairs of rabbit and other skins. (A communication.)

Dated 30th September, 1854.

2098. J. and J. Bradbury, Denton—Piled goods.
2100. G. Filhon, Paris—Glass chimnies for lamps.
2102. A. Boyle, Birmingham—Umbrella and parasol stretchers.
2104. G. F. Wilson and G. Payne, Vauxhall—Rosin oil.

Dated 2nd October, 1854.

2106. T. Gray, 60, St. Clement's lane, Strand—Bleaching fibrous substances for paper.
2108. W. W. Cook, Bolton—Woven fabrics suitable for petticoating, &c.
2110. W. Partington, Bonhill, Dumbarton—Bleaching.
2112. C. B. Hare, Bristol—Manufacturing printing blocks.
2114. J. Penn, Greenwich—Bearings for shafts of screw propellers.
2116. J. Stephens, Temple—Supplying purified air to rooms.

Dated 3rd October, 1854.

2120. J. Jeyes, Northampton—Paper threads and yarns.
2122. W. E. Newton, 66, Chancery lane—Locks. (A communication.)
2124. C. Nickels, Albany road, and J. Hobson, Leicester—Weaving piled fabrics by aid of wires.
2126. T. Cooper, Isle of Wight—Earthen pipes and mode of joining.

WEEKLY LIST OF PATENTS SEALED.

Sealed October 13th, 1854.

866. Arthur Hawker Cox, Ship street, Brighton—Improvements in coating pills and boluses.
872. Joseph Crosy, Paris—Improvements in machinery for manufacturing bolts, rivets, screw blanks, railway pins, and other similar articles.
890. Julian Bernard, Club chambers, Regent street—Improvements in the manufacture of boots and shoes, and in the machinery or apparatus connected therewith.
891. Julian Bernard, Club chambers, Regent street—Improvements in stitching, and machinery and apparatus connected therewith.
892. John Rowley, Camberwell—Improvements in the manufacture of a material as a substitute for leather.
906. Thomas Vickers, Manchester—Improvements in the manufacture of manure.
972. William Alfred Waddington, 44, Stonegate, York—Improvements in the construction of sounding boards for pianofortes and other like stringed instruments.

Sealed October 17th, 1854.

895. John Frearson, Smethwick—Improvements in steam engines.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Oct. 13.	3647	A Double Action Valve Stench Trap ...	William Bradshaw and John Sansom	Meadow Foundry, Mansfield, Nottingham.

Journal of the Society of Arts.

FRIDAY, OCTOBER 27, 1854.

NAVAL GUNNERY.

By Lady Bentham.

During the operations against Bomarsund, it appears that the Russians could not work their guns effectually, their men being cut off by our rifle corps; now if riflemen can impede the working of land artillery, their services would not be less effectual against vessels of war, especially seeing that their port-holes are frequently much larger than the embrasure of a gun in land fortifications. To diminish dangers of this nature to a ship's crew, Sir Samuel Bentham has stated that in small vessels, having only a couple of guns mounted in pairs, the one to draw out the other, if the platform on which they slide during the recoil remains fixed, so that they may be pointed by the motion of the vessel itself, the port-holes need be no broader than the diameter of the gun, and no higher than sufficient to admit of the little elevation or depression necessary according to the distance of the object aimed at; but if the gun, together with its sliding carriage or platform, be traversed to different angles, the port-holes must then become extended in a manner suited to this purpose. When guns are mounted *without* recoil, so as to turn on a pivot to fire in various directions, exposure to the enemy's shot is evidently much increased unless a kind of *bulwark* be introduced, in the form of a segment of a circle, so as to be traversed with the gun round the pivot on which it turns. Sir Samuel had satisfied himself with a bulwark he had contrived for so traversing with the gun, but no drawing or description of it has been found, so that it has again to be invented.

Were the port-holes so closed, evidently the captain of the gun could not see the enemy, consequently could not take aim, but Sir Samuel proposed "a simple means of obviating this inefficiency by the introduction of a mode of taking aim by which the largest piece of artillery may be pointed with as much ease, expedition, and accuracy, as a sportsman aims his fowling-piece." He goes on to say:—"The principle on which this mode is grounded consists in the dividing the taking aim into two distinct operations, the horizontal and the vertical aim; in the employing the motion of the ship itself for pointing the gun in the horizontal direction, and in taking advantage of the undulatory motion of the sea for bringing the gun to its proper *level*. In fact this up-and-down motion of the sea, which has been looked upon as a great impediment to the taking aim, will be found to be the best, and indeed the only efficient means of pointing a heavy piece of artillery mounted on board a navigable vessel." * * * "It will be admitted that while a vessel has steerage-way, it will be easier for a single man by means of the helm to direct the vessel, and thereby to point the gun in the horizontal direction with expedition and accuracy though it be of the largest size, than it would be for any number of men to direct it by traversing it on a deck or platform. It is equally evident that if the vessel be large enough for three or four such guns to be fixed, all pointing in the same direction, they might all be simultaneously directed by one man at the helm with the same facility and accuracy." * * * "As to pointing guns in a *vertical* direction, so as that the shot shall go neither too high nor too low, no means can be so certain in an agitated sea as the seizing the instant when the pitching or rolling motion of the vessel brings the two sights in a line with the object, and which in most cases will occur several times in a minute." He then supposes the case of a 100-gun ship, and applies the same kind of reasoning, adding, "It is evident when the guns are at a considerable distance from one another, they should not be all fired at one angle, but at different angles, converging more or less according to the distance of the object." He then proposes simple rods, mechanically placed so that by their means the helmsman might bring the vessel, consequently the guns, to the required position; notices the few cases in which this mode of taking aim might not be applicable, and says, "I may add, that now that experience has shown how easily the force of steam, or even that of the ship's crew, may be applied to the turning a vessel, as well as to giving it progressive motion, there seems abundant reason for providing all vessels of war with sufficient means for placing and retaining them at will in the most advantageous position for combat."

Small as is the dependance on the accuracy of newspapers, still, from the accounts they have given of the trial in the Solent of Mr. Fleming's oval cannon, it may be perceived that it was *not*, as they have stated, "a failure." The gun was professed to be capable of throwing a missile to a distance of 4,000 yards, and it did so; nay, it is estimated that the shot which damaged the lighthouse had had the immense range of 5,000 yards. But the weapon *did* fail as to *aim*—the sea was rough, its undulatory motion great, so that aim could not be taken in the ordinary way; but had the above mode been adopted, the probability is that the shot would not have fallen so wide of its destination.

Of late years much has been effected towards perfecting seamen in the aim and exercise of artillery, especially on board the *Excellent;* but Sir Samuel has said that "it is not in the still waters of a harbour that gunnery can be effectually acquired, for that good *sea-legs* are an indispensable qualification in a naval gunner." It would seem that Admiral Sir Charles Napier and Rear-Admiral Chads are of the same opinion, since they have caused the seamen of the Baltic fleet to exercise very frequently great guns on board the fleet in that sea.

Should the Society of Arts forward an extensive use of steam-power on board ship, one of its most advantageous uses in vessels of war would appear to be its application to the working the guns. But, however many the men that might thus be spared in the use of ordinary recoil carriages, still more men would be saved were the guns mounted *without* recoil. Were bulwarks, as above-mentioned, introduced to protect the men, all danger to them would cease could the gun be loaded at the breech.

Attempts to load guns at the breech seem hitherto to have failed from two very different causes, the one that no suitable provision has been made for the expansion of the metal by heat, great as is its degree increased on firing a piece of ordnance; a second cause is, that the manipulate of a moveable breech would require nearly as many men as to draw out a recoil gun and carriage. The latter difficulty would cease were steam the power applied, for the lifting weights by its means is easy. As to the perfect closure of the breech, the mode of juncture proposed by Sir Samuel for another part of a gun seems equally applicable to its breech, namely, "in the way that the lids of cast-iron digesters are made to be connected, or disconnected, with the body of the digestor." Surely this mode would be found as effectual against the expansive force of gunpowder as it is against that of steam. The culinary digesters in common use are furnished with a valve, which opens when there is considerable pressure within the vessel, but a Papin's digester for experimental purposes has been known to resist a far greater force than that produced by a charge of gunpowder as used for the propulsion of a shot. Were guns on shipboard mounted without recoil, and loaded at the breech, all the hamper on the deck occasioned by ropes or chains would cease, and, of course, the space saved which is now indispensable for the recoil of a gun.

In the *Journal of the Society of Arts*, 1st September, 1854, is a valuable article, by Mr. W. Bridges Adams, headed "Ordnance." In it is said, "The ship itself is not a fixture, the vibration is absorbed in the water." So thought General Bentham, and that this circumstance might materially have contributed to the success of non-recoil

on board ship. This surmise seemed, however, to have been nullified by the experiments of Mr. Fearnall on a *long* gun, mounted non-recoil.* This gentleman "put two fir posts into the *ground*, three feet asunder, to represent a fort, * * * the gun was ready for trial, the admiral, officers of the navy and artillery, present * * *. I requested the admiral to have the gun sealed with 6lbs. of powder, and the next time with *three* round shot; the gun was fired, and with this heavy charge of shot, to my great satisfaction, all stood well. They then fired eleven shot as fast as they could, elevating and depressing the gun to the extreme, and *all stood well*." On a subsequent day there were other trials, all equally satisfactory to the naval and ordnance authorities present. However, as in the blue-book of the Committee of the House of Commons on Navy Estimates, 1848, it appeared that iron was thought unsuitable for vessels of war, though the commanders of the only iron vessels of war that had at that time been exposed to an enemy's shot gave evidence in favour of iron-built vessels for warlike purposes; as it seemed, from Sir Samuel's papers, that the only way in which the resistance of that metal could be accounted for was the small degree of recoil which might have place in a vessel when afloat; and as Mr. W. Fairbairn, of Manchester, had been present at experiments on the resistance of iron to shot, I requested his observations on the subject; consequently, he most kindly furnished me with scientific reasons, showing the impossibility that so large a mass of matter as a ship should have the least recoil in water on the firing of her guns. It might have been some such consideration which elicited one of Sir Samuel's latest notes on naval construction, which was that a vessel of war should have "bones of iron, flesh of wood, skin of copper."

Independantly of cost, there seems sufficient reason for causing guns for naval service to be as light as possible, thereby enabling a vessel to carry a great number of the throwing missles of large diameter. It would seem probable that the placing some elastic substance behind the breech of a piece of ordnance, as suggested by Mr. Bridges Adams, would be an important improvement in gunnery, since it has been ascertained that a very trifling matter suffices to prevent the mischievous effects of the tendency of a gun to recoil; for instance a 32-pr. carronade requires only a 9-inch breeching to retain it; and it may be observed that ordnance so mounted was never forced to kick, though the piece, a 32-pr. carronade, was "fired in quick succession," 80 rounds without even the breeching being at all chafed or the ship at all affected by it. The Redbridge, a schooner of about 160 tons, had one of her carronades fired when loaded with three shot.

But after all the discussion and correspondence on the subject of non-recoil, its enabling a gun to throw a shot to a greater distance than from a piece suffered to recoil, is still a matter of opinion, not of certainty. It may now, however, be hoped that this particular will be shortly ascertained by the Board of Ordnance, since a trial of the distances by which shot would be propelled according to different lengths of recoil was one of the experiments indicated by Sir S. Bentham, and which their secretary affirms are in course of trial.

* Naval Papers, No. 7, p. 30, 37.

Letter IX.

FLAX AND ITS PRODUCTS IN IRELAND.

Contributed By Wm. Charley, Seymour Hill, Belfast.

The chemical composition of the flax plant, according to Professor Hodges, Queen's College, Belfast, is

Water	56·64
Organic matters	41·97
Ash	1.39
	100·00

Ash per cent., dried at 212° Fahrenheit, 3·20. One hundred parts of Irish Flax straw gives 0·53 of nitrogen. The ash contains:—

Potash	20·32
Soda	2·07
Chloride of sodium	9·27
Lime	19·88
Magnesia	4·05
Oxide of iron	2·83
Sulphuric acid	7·13
Phosphoric acid	10·24
Carbonic acid	10·72
Silica	12·80
	99·31

The analysis of Sir Robert Kane differs a little from the above, in the proportions of some of the substances. I have given the analysis of Professor Hodges, because he has devoted much time to the study of the flax plant, and has the advantage of residing in the very centre of the district where flax cultivation and manufacture is carried on—a position eminently conducive to repeated experiment and correct investigation.

One of the first points to be attended to in practical agriculture, is to become acquainted with the composition of the plant to be cultivated, and the soils suitable for its production. I have just given the chemical definition of the flax plant, and will now follow with Sir R. Kane's analysis of three kinds of soils, that were found by some members of the Royal Flax Improvement Society of Ireland, to be highly favourable for flax culture:

	No. 1.	2.	3.
"Silica and Silicious sand	73·72	69·41	64·93
Oxide of iron	5·51	5·29	5·64
Alumina	6·65	5·70	8·97
Phosphate of iron	0·06	0·25	0·31
Carbonate of lime	1·09	0·53	1·67
Magnesia and alkalies, with traces of sulphuric and muriatic acids	0·32	0·25	0·45
Organic matters	4·86	6·67	9·41
Water	7·57	11·48	8·73
	99·78	99·58	100·11

The organic matter in these soils was rich in nitrogen; their fertility is, therefore, from the analysis, easily understood."

For the information of the non-scientific reader, it may be said that the soil best suited for flax is a nice dry loam, not too light, and yet not of a clayey nature.

The land should be drained and free from weeds; much damp injures the crop, and a quantity of noxious plants rising with the flax will materially check its perfect development.

In Belgium, flax is usually sown after oats, but my experience and that of my neighbours in this climate is decidedly in favour of sowing after *wheat*. The rotation I should reccommend, and what I usually practice, is to break up lea ground in oats, followed next year by potatoes and turnips, &c. 4th year wheat, the one-half laid down with clover and grass seeds. 5th year, flax (¼), beans (¼), and clover (½). Under this rotation, on a farm of 100 acres, the crops would stand thus:—

Grazing	20	acres
Oats	20	do
Potatoes, turnips, &c.	20	do
Wheat	20	do
Flax (5 or so) clover-hay (10) and beans (5 or so)	20	do
	100	

Of course this rotation is subject to frequent modifications such as stealing a crop of turnips after early potatoes, and

taking vetches or rape before late turnips. Some people might wish for more flax and others for less; this can be varied at discretion, provided it does not come oftener than once in ten years on the same soil. It is great folly to put in flax the first year after a potato crop; the plant grows too rank to thrive, and the farmer besides loses the intermediate very profitable crop of wheat, without any real benefit to counterbalance the sacrifice. This folly is sometimes committed by ignorant farmers who think flax an exhausting crop; whereas a little scientific knowledge explains that *if not grown oftener than once in ten years on the same soil*, it is not a severe crop among the usual group and in its proper place, but quite the reverse. In fact, if sown after wheat, and the ground laid down with clover and rye grass, it is really an *extra crop*, grown without manure and in no way interfering with the oat crop that usually follows hay or grazing.

Too often the profits of the flax crop have been over-rated, and much disappointment caused thereby, among parties who tried the cultivation with only moderate success.

For my own part I have never been able to reach the immense profits I hear of and see in print, though I have certainly realised a fair remuneration on all average crops. I mention this that novices may not be misled into the idea of making fortunes *all at once* by flax cultivation; what I desire is to see it introduced by every agriculturist in Great Britain as a portion of the *regular rotation* on his farm; and if one-twentieth part of the good arable land in the kingdom was thus regularly under flax, we would be quite independent of any foreign supply, and would possess a stock of *fibre* and *linseed* that would in many ways contribute to the benefit of both the manufacturing and agricultural interests.

As I have alluded to the important question of profits, I may as well introduce here some statements of the actual cost of flax cultivation on my own farm, carefully prepared for me by my land-steward; also the result of similar experience of several gentlemen about Belfast, who took the trouble of keeping accurate accounts:—

No. 1.—Flax grown on Mr. Charley's Farm, *one statute acre*, considered an average crop:—

Dr.	£	s.	d.
To ploughing 1st, 10s. 6d.; 2nd, 7s. .	0	17	6
,, one grubbing and two harrowings	0	10	6
,, twice picked of weeds	0	2	6
,, harrowing seed and rolling . . .	0	1	9
,, weeding	0	4	0
,, preparing rushes and ropes . . .	0	2	8
,, pulling	0	8	0
,, rippling and binding	0	12	6
,, saving and storing bolls	0	1	2
,, cleaning out water pond	0	1	2
,, carting to water	0	4	8
,, putting in ditto, and fixing . . .	0	4	1
,, lifting out of ditto	0	1	2
,, carting to grass	0	4	8
,, spreading	0	4	4
,, lifting, binding, stooking . . .	0	2	6
,, carting home	0	3	6
,, stacking and thatching	0	3	2
,, carting to mill	0	4	1
,, ditto back	0	2	9
,, scutching 29½ stones	1	14	2
,, seed, 1 barrel	1	5	0
,, rent and taxes, 40s.	2	0	0
Total expenses on one acre . .	9	15	10
Cr.			
y sales, 29½ stones, at 8s. . . £11 16 0			
olls for feeding 30 bshls, at 8d. 1 0 0 =	12	16	0
Profit . . £	3	0	2

No. 2.—Flax grown on Mr. Hunter's Farm, at Dunarry, 1852, above an average crop:—

Dr.	£	s.	d.
For rent and taxes, 5½ acres (Irish) at £3 10s., equal to about 8 9-10ths acres statute measure, at 40s.	19	5	0
For ploughing and preparing ground . . .	13	0	0
For seed	11	0	0
For weeding, pulling, and steeping work, &c.	15	0	0
For scutching at mill	14	10	0
	72	15	0
Cr.			
By sales, 32 cwt. 10 lbs. . . £ 10 17 9			
By ditto, 342 cwt. 21 lbs. . . 109 6 0	120	3	9
Profit . .	47	8	9

being £5 6s. 7d. per statute acre.

No. 3.—Flax grown on Mr. Coates's Farm at Malone, 1850, a fair crop:—

Dr.	£	s.	d.
To rent of 8 Irish acres, at £5, nearly equal to 13 English or statute, at 61s. 3d. . .	40	0	0
To taxes on same	2	9	3
,, ploughing, preparing ground, and sowing	6	12	8
,, cost of sowing	19	2	0
,, wages for weeding, pulling, and stacking .	15	7	9
,, rolling, taking off seed, and re-stacking .	8	0	8
,, commission on sale of seed	1	0	0
,, steeping, spreading, and cartage of flax, cost	7	1	10
,, To cash paid for scutching at mill . . .	21	12	10
	121	7	0
Cr.			
By cash received for seed— 89½ bshls, at 9s., £40 5 6; 22 do kept 7 9 0			
By cash received for inferior seed for cattle, per flax fibre— 379 stones of 16lbs., at 6s. £113 14 0 =	161	8	6
Profit . . . . £	40	1	6

equal to £3 1s. 8d. per statute acre.

This Malone farm is close to Belfast, and the rent is consequently very high for an agriculturist. The price obtained (6s.) is rather below the average, and shows the crop was nothing particular in fineness or quality.

Mr. Hunter did not save the seed of his crop of flax, but treated it in the old-fashioned manner, which he thinks most remunerative. Mr. Coates saved the seed for sowing; while my steward took off the seed for feeding purposes only. Both these parties are gentlemen of high standing and probity, and I am sure furnished perfectly correct accounts of their crops and expenses as far as they knew, but I think Mr. H. under-estimated his *working expenses a little*. Further statements in reference may again be made at a future period; in the meantime, having, it is hoped, convinced the agriculturist that flax may be profitably cultivated, and having explained the composition of the plant, and the soils adapted for its successful production, we must proceed to consider next the minute details of its cultivation. This will be reserved for another paper.

THE PREPARATION OF FIBROUS SUBSTANCES.

(From the Madras *Athenæum*.)

As the fibres of Indian plants are now beginning to attract the attention of European manufacturers it may be of some use to publish the results of experiments that have been tried to prepare them for the English market, and to turn them to practical account in India. The demand for fibrous substances as substitutes for flax, hemp, silk, cotton, and hair, is now becoming so great that a market cannot be supplied with a sufficiency of these raw materials to keep our large manufactories in full operation, and India is looked to as the country whence these supplies must be furnished.

Flax, hemp, and cotton are the substances most urgently called for, and as the two former are wasted in large quantities in many parts of India, and are hardly ever prepared with sufficient care to make them profitable articles of export, a description of the simplest and most economical methods of cleaning them may prove of interest to the public; and, as numerous requests have been made for detailed accounts of these experiments, it may be as well to give them immediate publicity.

The usual process followed in India for preparing fibres of succulent fleshy plants, consists in cutting the plants when in full vigour and burying them in wet sand on the banks of a running stream, or in mud at the edge of a tank, and leaving them there to soak and rot for one, two, or three weeks, according to the temperature of the weather. The plant is then taken out and spread in the sun to dry, after which it is stacked or put up in heaps, and covered with a matting of dry leaves to shelter it from wind or rain. It is afterwards beat with heavy sticks upon the dry hard ground, and well rubbed between the hands to separate chaff and dust. Another method is to take the soaked plant in bundles, and beat out the pulp and impurities on a flat stone at the edge of a tank or river, in the same way as the washermen wash clothes.

The fibres of the Marool or Sansiviera Zeylanica are prepared by scraping and washing in fresh water soon after the plant is cut. The fibres of the Yercum or Calotropie gigantea are separated by exposing to the sun for three days the fresh cut stalks of the plant stripped of the leaves. The bark is then peeled off, and the fibres are picked out with the finger and thumb. The two last processes yield fibres of good quality, but in too small quantity to prove remunerative, except as an employment for children.

The system of cleaning fibres by rotting is not suited to warm climates, as putrefaction sets in almost as soon as fermentation, and while one part of a heap of leaves or stalks is beginning to ferment, other parts are brown and stained from putridity, while the central parts remain fresh and unaltered.

To preserve the colour and strength of fibres all that is necessary is to separate the pulp, bark, or wood, as soon as possible and by the least complicated process. The pulp or juices of plants usually contains mucilage, starch, or gum, which begin to ferment within 24 hours after the plant is cut, and if it be left in water during warm weather fermentation is completed within two or three days; in cold climates it takes from three to four weeks to run its course. The result of fermentation being completed is that the sap becomes acid and destroys the strength of the fibre. This is followed by putrefaction, which stains the fibre and makes it brownish, brittle, and like chaff.

If the plant be exposed to the sun for a day or two after being cut, the sap dries and the colouring matter stains the fibre which cannot then be easily separated from the bark, spiral cells, or woody fibre. In some plants this discolouration is green, in others brownish, or dusky yellow, which cannot be removed by bleaching as it is a species of natural tanning which occurs in the plant. Such fibres always remain harsh, stiff, and woody, with a tendency to snap on a sudden strain. The plaintain fibre is the most liable to this defect from the sap containing a good deal of tannin which can only be removed by quickly expressing the juice and only cutting as much of the plant as can be cleaned in one day.

The general rules for cleaning the fibres of pulpy plants are, first to bruise or crush the plant, keeping the juice for a coarse kind of vinegar, required in another process. The common native sugar-cane mill, with two perpendicular rollers, a long lever handle, and a channel to convey the juice into some convenient vessel answers this purpose very well; the cost of such a mill is about ten rupees. Those who cannot afford to purchase or erect one, but who can command plenty of Cooly labour, will require to provide a few long planks and heavy wooden mallets to beat the plant till all the pulp is loosened. When it is in a pulpy mass, it must be taken at both ends and twisted opposite ways to squeeze out the sap. It is then to be well washed in plenty of water, untwisted, and scraped in small handfuls at a time on the board, with an old blunt table-knife or a long piece of hoop iron fastened into a straight handle. When all impurities are removed, the fibres may be soaked for an hour or two in clean water, and then hung up in the shade to dry. Exposure to the sun at first is apt to discolour them. By this simple process fibres of great strength, of a silky appearance, and of a good colour, can readily be prepared. The scrapings must be well washed and set aside in the shade to dry as tow for packing, or as a material for making paper.

The Indian plants to the cleaning of which this process is applicable, are those of a fleshy or pulpy nature, as the Aloe, Agave, Sansiviera, and Plaintain genera, of which there are many species. The prices offered in England for Indian fibres thus cleaned varied from £25 to £70 pe ton. Fibres of the same plants, cleaned by the usua Indian process of rotting, and sent home at the same time, were valued from £12 to £18 per ton, and were said to be only suitable for the manufacture of coarse twine or brown packing paper. The finest Plaintain fibre, when carefully cleaned and dressed, was said to be suited for the imitation of silk in carriage, braid, and carpet work. The average value put upon the fibres was £50 per ton, when Russian hemp was selling at £40 per ton. A profitable export of plantain and aloe fibres has now been established on the west coast, and is likely to be extended to other parts of the presidency.

On the cleaning of plants having bark and woody fibres. —Many of the Indian cordage plants are of this kind, and the native process of cleaning them is very similar to that followed in cleaning fleshy and pulpy plants, viz., by burying in sand or mud at the edge of a tank or in a river, and leaving them to rot. There is this difference, however, that the plants are steeped longer, and are never exposed to the sun to dry, or stacked and covered with matting to be cleaned by dry beating. If this were done the woody fibre would get hard and brittle, and would again adhere to the other fibre, which, being partially rotten, would break in the cleaning. To obviate this, the rotted plant is taken up in large handfuls and beaten on flat stones, first at one end and then at the other, in the same way as clothes are washed by the Dhobee; they are next well rubbed and washed, to separate the impurities, and are spread out on the ground to dry. We can hardly wonder that most of the string and rope made from fibres prepared in this rude, coarse way should be dark in colour, possessed of no strength, and of little value. As a general rule every day's steeping of a fibre takes from its strength and imparts more or less colour. To obviate this, woody plants should be first well beaten with a mallet; then the bark should be separated from the stalk, for it is on the inner part of the bark that the fibres for cordage usually occur. When the bark is brought to a pulpy state, it must be well washed in clean water, to remove as much of the sap as possib'e, for this is the destructive agent which soon causes putrefaction. The old mode of steeping or rotting flax plants is quite abandoned in many districts, as the water was found to be poisonous to cattle and fish, and the neighbourhood where it was carried on became feverish. The same remark has been made in India; and there a e many districts where flax is cultivated on account of the linseed, but the plant is burnt and fibre wasted lest cattle should be poisoned by eating it. In Flanders, where the greatest care is bestowed on the growth of flax, the preparatory crops are barley and rye, with turnips after them, the same year. It is grown the third year of a seven-course rotation, or the fifth year of a ten-course rotation. It is considered an exhausting crop, and the land is richly manured and dressed with liquid manure; the seed is then sown abundantly to the proportion of 160lb. to the acre, a slight harrowing and the passing of a light roller over the ground ensuring quick germination

If the quality of the fibre be the chief object the seed is sown thickly; the plants come up in a crowded manner, and are tall and of delicate growth. If the seed be the chief object, thin sowing and exposure to the sun is the best, the stalks becoming strong and branched with coarse fibre. The weeding of the flax forms a considerable item in the expense of its cultivation. This is performed when the plant is a few inches high; it is done by hoeing, or by women and children, who with coarse cloths around their knees creep along on all-fours, which injures the young plants less than walking upon them. The weeders also take care to face the wind, that the tender flax, bent down by their weight, may be assisted in rising again. When weeding is too long delayed, the plants are bruised and injured, and cannot recover their erect position. Some tall and slender varieties are supported by stakes, lines, and cords, about 1 foot or 18 inches from the ground, or ropes are tied to stakes lengthways and crossways, so as to form a network all over the field. The time of pulling the crop depends upon the season and the intention of the grower. If fine fibre be the object he pulls the flax rather green, but if the quality of the seed be considered a longer time is given before pulling. The latter object is generally attained when two-thirds of the stalk have turned yellow, and when the seeds have changed from their fluid state, for they ripen sufficiently after the flax is pulled, if not separated from the stalk. Taking up the crop in a wet state is avoided if possible.

The pulling is carefully done by small handfuls at a time, which are laid regularly across each other to dry, and are afterwards collected in larger bundles, the root end on the ground and the seed ends tied lightly together, as sheaves of grain in the harvest-field. The practice of cultivators differs very much as to the after processes. Some disregard the seed, and commence steeping the flax at once; some carry it as soon as it is dry under a shed, and take off the capsules by a process called rippling; others house the flax as soon it is dry, allowing the seed to remain on, and deferring the processes of rippling and steeping till the following season.

THE GREAT WORKS IN PARIS.

TO THE EDITOR OF THE TIMES.

SIR,—I had the honour last October of sending you a slight sketch of the improvements and works which are being carried out and constructed in Paris under the direction of the Emperor. At that time many of them had been only recently commenced, and it was very difficult to speak of what the effect of them would be when completed. During the last twelve months many thousands of workmen have been continually employed upon them, and every possible effort has been made to hasten their completion, so that Paris may be ready to receive the world next summer, and it is now very probable that works, which will have cost from 10,000,000*l.* to 14,000,000*l.*, and which, under any other less powerful impulsion, would have required many years of labour, will, under the direction of the determined hand which is urging them forward, be nearly finished by the opening of the Exhibition next May. The Emperor is evidently determined to exhibit to his visitors not only the wonders of the Palace of the Champs Elysées, but those also of his capital, which by that time will be, without doubt, incomparably the most magnificent in Europe or the world.

It seems to me that an account, however meagre, of what is being done in Paris, cannot fail to be suggestive of some important considerations to us, at a time when the state and improvement of our own vast metropolis occupy so much of our attention.

Several reasons have no doubt concurred to induce the Government and the Municipality of Paris to expend these enormous sums, but one of the principal has clearly been the way in which railways are altering the relations between the capital and the provincial towns, rendering them so much more intimate than they used to be when the provinces were separated from the seat of Government by leagues and days of coach travelling and coach roads.

In these days of railroads and express trains, a metropolis is becoming more and more every year the great central meeting-place and school of the nation—the only one town where all citizens of moderately easy means are sure to pass, if not some portion of *every* year, at least some portion of their lives.

When the great majority of the people never saw the capital at all, and when, even of those who did visit it, many, if not the majority, only saw it once in the course of their lives, when it was in reality, comparatively speaking, only the greatest and richest of provincial cities, it was a serious question how far a Government was justified in expending part of the funds of a nation in embellishing a city which nine-tenths of the nation never visited at all.

But now all has changed. A great part of the middle and higher classes visit the metropolis every year. The numbers of even the poorest classes who see it once, twice, and even more times in the course of their lifetime, are steadily increasing. In England it is now only an evening's journey from Lancashire or Yorkshire, and only a three hours' journey from Birmingham to London. As travelling becomes, as it will become, still more rapid and still cheaper, and as education becomes more diffused and improved, the number of those who will visit the central city every year will rapidly augment, and we may look forward shortly to a time when most, if not all of those who are in comfortable circumstances, will not rest satisfied unless they see, at least once in their lives, all the collections which from their character must necessarily be massed together in the capital.

The metropolis contains the Palaces of Government, the great national museums, which, from their very nature, could not be divided among or repeated in the provinces, which are therefore placed in the city where the majority of the people meet most frequently, and which derive a great part of their value from the very collection of the objects into one place. It contains, too, the great galleries of art with their inestimable treasures, increasing in value more and more as time and education advance; it contains the central halls of justice, some of the principal central establishments of commerce, some of the chief halls of learning, and all the innumerable accessories of wealth and civilization which its central character draws within its walls.

All this obliges the country to spend more in constructions and embellishments in the capital—and that, too, for national objects—than in any other city; and it draws together, by so doing, greater numbers of students of art, of mere sight-seers and of visitors, than any other city has any chance of doing. Obviously, therefore, the metropolis affords not only greater opportunities for grand experiments in architecture, decorations, and art than any other town, but, by producing striking results in these works and in its municipal government, it affords great aid to many of the highest departments of *municipal and national education.*

In this way, what the central Government expends in these days upon the metropolis is now, if it be only well laid out, and so as to provide any of the important objects to which I have alluded, expended most truly upon the nation.

It is quite clear that the French Government has been inspired in all it has been doing in Paris by this idea. No doubt, the employment of the *ouvriers* and the satisfaction of the church have had, also, a great deal to do with the undertaking of so many and such extensive works at *one time*; but, if this necessity had never existed, there is no doubt the idea to which I have alluded, and which has clearly influenced the government in all that has been

done, would have caused all these works to have been ere long completed.

That this is so is evidenced in many ways. The character of the works themselves; the re-arrangement and classification of the public galleries, so as to exhibit the history and progress of art in the most instructive way; the embellishment of the public buildings, so as to exhibit prominently the striking and instructive facts of French history; the continual recurrence in the public places, and on the public buildings, of names or statues, recalling to memory the distant municipalities; the names given to public places; the character of the public *fetes*, and the preparations for the future,—all show the prominence and effect of the idea to which I have alluded.

This is still further shown by the gathering together by the Emperor, at different times, of the chiefs of the provincial municipalities at Paris for the purpose of conference with himself and with one another, and also by the construction of the splendid Palace of Exhibition, which by the way in which it is built, is clearly intended to be preserved for ever for the purpose of periodical reunions, and of periodical expositions and comparisons of the results of the industries of all the great provincial municipalities.

It is evidently the intention of the Emperor to make Paris, in all respects, the great school, model, and central meeting place of the French empire; and, in doing so, he is only following in the train of the leading ideas, tendencies, and necessities of the age, and of civilisation.

Well would it be for France if the system of French centralisation stopped here, instead of sapping, as it does, in other respects, the local energies.

But to describe what is being done.

The vast palace of the Tuileries and the Louvre, with its thousand histories, is nearly completed. It now stands alone. On one side are the gardens, on another the quays, on another the new street, the Rue de Rivoli, passing through a square formed between the Tuileries and the Palais Royal; and, on the fourth side, a square planted with shrubs and trees, and connecting the quays with the Rue de Rivoli. This immense palace, the greatest now in the world, is thus entirely separated from the neighbouring buildings, and is surrounded on every side by open spaces and magnificent perspectives. Visconti has done his work well, though he has not lived to see it completed. He has designed the new wings so as to harmonise perfectly with the older buildings, and so as to connect the Louvre with the Tuileries, without making the differences of their styles at all apparent. The workmen are now cutting down, levelling, and paving, the interior square of this vast building, and, when they have completed it, the Palace will itself enclose the greatest and most magnificent square in the world—a square capable of encamping a considerable army, which might, if need required, be shut in and bivouacked there, as in a great citadel, in the very midst of the city. Standing in the centre of this square a spectator would imagine—as I believe is true—that the Palace was large enough to provide for the accommodation, not only for the Court and its attendant troops, but also of all the galleries and schools of art, and of all the bureaux and departments of government. Whether it is intended to collect in this one centre all these separate departments or not, I am unable to say. The new wings will, at any rate, enable the government to classify and arrange in the most perfect and instructive manner all the galleries and museums now collected in the Louvre.

From the Place de la Concorde, which has been rebeautified, and is nearly completed, the new street, I have mentioned, the Rue de Rivoli, is being formed, extending for a mile and a half on a perfect level, and in a perfectly straight line to the Hôtel de Ville. It has been constructed by the city and the state at an expense, I believe, of nearly £4,000,000. It is about as wide as Regent-street. The houses on each side are, however, nearly twice as high as those in Regent-street, and are all built of white stone, with highly ornamental balconies and sculptured work. They are all six or seven stories high. This street passes first along the beautiful gardens of the Tuileries, which in this part forms one side of the street, and then along one side of the Palace itself. Opposite the Palais Royal, as I have before said, it passes through a square, one side of which is formed by the Tuileries, and on the other by the Palais Royal. It is then continued along the side of the Tuileries, and passes on the left hand a fine old church, which has been disclosed by the demolition of the surrounding houses, and which is being now perfectly restored. It is then carried on through another square formed in front of the Louvre, and is continued through a double line of beautiful buildings, containing shops on the ground floors, with the apartments of the *noblesse* above them. It then passes through a third square, which has been already planted, and in the midst of which rises the old tower of St. Jacques, 150 feet high. This tower has been disclosed by the destruction of the surrounding houses, and is being perfectly restored as a beautiful monument of the middle ages. From this point the street is continued, between lines of magnificent houses, to the front of the Hôtel de Ville. The perspective from one end to the other, looking along this line of squares, palaces, monuments, and gardens, is superb. Many hundreds of houses have been pulled down to make way for this improvement, which in a sanitary, artistic, and military point of view, is as important an alteration as could have been devised. The Hôtel de Ville and its neighbouring barracks are now connected with the Palace by two wide streets—one running along the quays, and the other along the line I have described, parallel to each other, and connecting the same points.

Round the Hôtel de Ville they have pulled down a great many houses. They have left the seat of municipal government standing in the midst of a square, and, behind the hotel, forming one side of the square and facing the long line of the Rue de Rivoli, they have constructed an immense stone palace, as a barrack for troops, which are kept quartered here continually, evidently to command the centre of the city. From the square of the Hôtel de Ville up to the Strasbourg railway station, they are constructing another magnificent street, about a mile in length, as broad as Regent-street, planted on each side with trees, and lined with houses six stories high, and all constructed of white stone. This street will open at one end into the quays, and at the other end will be terminated by the handsome railway station. A great part of this street also is completed. It was commenced about 18 months ago, and, such are the numbers of workmen employed, that it is already open for traffic along more than half-a-mile of its length; many of the houses are enclosed, the trees are planted, and the pavement laid down. It will soon form a splendid entrance into Paris.

The scaffolding in the Tuileries and in the Rue de Rivoli is in itself quite a sight worth seeing. It is said that 2,500 workmen have been kept constantly employed on this Palace alone.

Along the whole length of the quays work seems to be going on on every hand. They are completing the quays in their whole length. Everything along the river is being put into a state of perfect order and repair. All the walls, approaches, and banks of the river are being completely finished. The wing of the Tuileries facing the river has been restored and lavishly decorated. All the bridges which were at all out of repair are being restored, and five of them—viz., the Pont des Invalides, the Pont d'Arcole, the Pont Neuf, the Pont Nôtre Dame, and the Pont d'Austerlitz, have been or are being almost entirely rebuilt. Upon the Pont des Invalides alone they have just expended 700,000 francs.

The Palais de Justice, which stands on the quays, and its beautiful Sainte Chapelle, are being entirely restored, while as much of its ancient character is being preserved as was possible. The *coup d'œil*, as one stands on the Pont de la Concorde, looking towards the old city, is

really splendid. Everything betokens energy, constructive genius, useful improvement, and high taste. Looking forward, you see the restored towers of Nôtre Dame, La Sainte Chapelle, the re-constructed quays, bridges, and palaces; on the left lies the Place de la Concord, just completed; on the right are rising the two spires of the new church just where a building of some elevation was required; and behind, in a line between the bridge and the Arc de Triomphe, rises over the trees the arch of the new palace for the Exhibition of next summer.

But on this spot the spectator sees one thing which will make him sigh over London more than anything else. Here, if he looks down at the river, which be it remembered, at this spot has traversed the whole length of the city, and has passed the Isle de Paris in a double stream, he will see that it flows beneath the bridge so pure that on many days he might see the bottom of the river through the water! It is kept so clean from all the impurities of the streets that it flows along its beautiful quays like a country stream, and is covered with baths, swimming baths, schools where swimming is taught, and places where linen is washed, while, instead of being a cause of ill-health, disgust, and effluvia to the city, it is an ornament, and a source of profit, of pleasure, and of health. If this is possible in such a city as Paris, with a river only about the size of the filthy ditch, the Irwell, at Manchester, what might we not accomplish with our own noble river in London? There is only one way left now by which we can hope to win a really magnificent *coup d'œil* in London, and that is, by forming quays along our river, by erecting upon them ranges of handsome buildings, and by keeping the river as pure as it is at Putney-bridge. Could we do this—or rather, if we *would* do this (for it might be done for less than it has cost to complete the Rue de Rivoli, with its squares and palaces)—we should have at once one of the most magnificent *coup d'œils* in the world, one of the most healthy and beautiful places of recreation that any city could boast of; we should make our metropolis one of the healthiest in the world; we should save an immense quantity of the most valuable products for our fields, and we should immensely increase the value of the two banks of the river. Almost everyone wishes this work to be carried out, and why it is not done no one can possibly imagine. As it is, our river is made a cause of stench and disease, the most valuable sites are lost, and the citizens and visitors of London are deprived of the pleasure and the profit they would otherwise derive from the river itself, and from the drives and promenades upon its banks.

But, in addition to the great works which I have enumerated as either just completed or as rapidly approaching completion, the next I ought to mention is the palace building for the Exhibition of next year. This noble building, which is intended to be permanent, as a vast hall for exhibitions, great public ceremonies, and Imperial festivals, is built on the left of the avenue leading from the Tuileries to the Arc de Triomphe. It is about 900 feet in length by about 500 in breadth. The exterior walls are of stone. There are two stories of massive arches rising one above the other, and ornamented with sculpture containing allusions to the principal cities of France. The arches themselves will be filled with glass. In the centre of one side of the Palace, which is parallel with the avenue, rises a lofty building, which is not finished. From what I could see of it, it seems intended to be surmounted with two towers. Beneath, the principal entrance to the Palace opens under a lofty arch. In the interior a broad gallery is constructed entirely round the building, supported on massive iron pillars and girders, and lighted by the windows and by the arched glass roof. The centre of the building, between the galleries, forms an immense hall, covered with an arched roof of iron and ground glass. There would be room in this building to feast either an army or all the municipal authorities of France.

Passing this building and the Arc de Triomphe, the visitor arrives next at the Bois de Boulogne, where the Emperor is laying out a park, with a large lake and ornamental grounds, which will at least rival anything of the kind that we have in England. This is understood to be his favourite work, and very large sums of money have been expended upon it during the last two years.

The church has received at least its share of all this lavish expenditure. The cathedral of Notre Dame, the churches of St. Denis and of St. Etienne du Mont, those in the Rue de Rivoli, the church of St. Eustace, the new church behind the Palace of the Corps Legislatif, the splendid church of the Invalides, and several others, have all had considerable sums expended upon them. The restorations of the Sainte Chapelle, and of several of the other ecclesiastical buildings, are of the most elaborate and costly kind. In the church of the Invalides all the constructions connected with the splendid tomb of Napoleon—the greatest work of Visconti—are now nearly completed, at a cost which it would be difficult to estimate. France is, however, able to say that she has received something for the money. It is a singular sight to witness the renovation of these splendid monuments of the history of the church and of religion at a time when one is forced by all one sees to doubt whether, in Paris at least, the religion itself has many very devout or faithful worshippers. But still they serve to embellish the city, and certainly they are some of its most splendid ornaments. Nor is it only in Paris that the traveller will see this renovation of the externals of religion. Everywhere throughout France a similar work is going on. The prefects have received their orders, and wherever you travel you find some magnificent church or cathedral rising from the ruins or decay of ages—restored at the cost of the municipalities—and it must be said that the restorations are being carried out with admirable taste and judgment, as they are being constructed utterly regardless of expense.

If the state of religion may be judged by the condition of its external symbols, certainly there is "a great revival" in the France of 1854. How far this is owing to the policy of the empire rather than to the religious zeal of the people, I must leave to your readers to determine.

But the fact is, that throughout France—at Paris, Strasbourg, Orleans, Bourges, Chalons-sur-Marne, Metz, Boulogne, Barleduc, &c., the church is receiving its share of the wealth of the country, and is clothing herself, or is being clothed, anew with some of the splendour of her middle-age history.

That the priesthood are favourable to a Government, which is so mindful of its religious duties is not a matter of surprise.

Besides all the works I have enumerated, there is another which, when completed, will be of great value to the city and to France; a railway is being constructed at an immense expense entirely round Paris. When completed it will connect all the metropolitan lines of railroad together, and enable the companies to carry both passengers and goods from one end of France to another across the metropolis without changing the carriage which started with them. This railway will greatly facilitate the transmission of merchandise; it will relieve the metropolitan streets from the passage of heavy goods and vans from one station to another; it will save the goods from the injury attendant on removal from one railway to another; and it will be very useful in facilitating intercourse between the suburbs of Paris. This is a work which was commenced under the empire, and which is now nearly completed.

The state of the streets and pavements in Paris has been greatly improved. The sewerage has been reformed; street sweepers are appointed throughout the metropolis with particular districts assigned to particular companies. No one is allowed to throw anything out upon the pavements between eight o'clock in the morning and nine o'clock in the evening. All that is thrown out after the

latter hour is collected and carted away during the night by night dustmen appointed for that purpose. This prevents a great deal of unpleasant effluvia, so common in foreign towns, and preserves an appearance of neatness and cleanliness which London streets are often wanting in, owing to the untidy practice which prevails in so many parts of sweeping out of the shop-floors on to the pavements all the accumulated rubbish of the day. No one who has known Paris for the last ten years can fail to notice the remarkable improvement which has taken place in the appearance of the pavements throughout the city. I was assured that this change had been forced upon the authorities by the Emperor himself.

In addition to all that I have mentioned, a magnificent free library, containing, I believe, about 200,000 volumes, has been built of stone, in the Italian style, and is now open near the Pantheon. The market-place, the seat of the celebrated *dames des halles*, is to be entirely rebuilt. I am told that an hotel on the grandest scale is to be erected in the new Rue de Rivoli, and that it has been under contemplation to pull down one entire side of the Rue de Richelieu, to widen the street, and to plant it with trees, so as to open another grand approach from the Boulevards to the Tuileries.

They have also entirely restored and refurnished the two pa'aces—the Palais Royal and the Tuileries—in a style which combines the greatest magnificence with the most perfect good taste and simplicity of detail; and lastly, in order to protect all the great works of Paris, to preserve order, and to repress crime, the Emperor has, as your readers are aware, decreed that a system of police similar to our own shall be formed for his metropolis, so that the very commencement of lawless acts and disturbances may be repressed.

Now, Sir, far be it from me to say that we should be right to emulate in London the extravagance of the Imperial Government, but one thing we should do well to imitate, and that is, to have some gradual scheme of improvement, by which present and future governments might be guided, and, as far as possible, to have some certainty of at least avoiding gross mistakes, by confiding future plans to the direction of some committee formed partly of architects and scientific men. But at present what is the result of our want of system in this respect? The Houses of Parliament are being built in one part of London on one of the lowest of the sites we had at our command, and exhibiting its magnificent front to one of the most wretched suburbs of the metropolis. The Record-office is rising in another part of London, and in one of the back streets in the city, facing nothing, and lost in buildings of the most miserable description, where scarcely any one knows how to find it out.

The British Museum has been built in another part of the town, with no other fine building near it—itself only the front of a building—and enclosed entirely with houses of a third and fourth-class order. The new museum in Piccadilly forms only part of a line of shops. The "finest site in Europe" is wasted and covered with a building one would gladly see on the site of the British Museum.

All this is very unfortunate; and what is the cause? We have not thought the decoration of the metropolis or the erection of national edifices to be worthy of any scientific or artistic direction. People would not be satisfied to trust the actual *construction* of a palace to a leading orator of the House of Commons, but who selects the design or who regulates the design we have not hitherto deemed worthy of a thought.

If there had been any one continued plan or any unity of artistic direction or design in all the vast expenditure which has gone on during the last 50 years in London, we should now even have had the most magnificent and delightful city in the world.

We have still time for reform. We have determined to build a gallery for our great art collections. Will this be so planned as to be worthy of our age and country, or will it be another public building added to the long list of those which are unfitted for the purpose, unsatisfactory for design, and concerning which the only praise that can be bestowed upon them is, that they are placed on sites which are so chosen that people may see as little as possible of them?

For our gallery we have one of the finest sites that any capital in the world can offer for such a building, and that is the spot where the old Kensington Palace stands. It has been strongly recommended by those best qualified to advise. It stands alone, detached from any buildings, with a great deal of open space on every side, and in a good dry clear atmosphere. It faces three avenues, stands high, and commands some of the finest points of view in the metropolis, and it can be seen from a considerable distance. It would be admirably suited to the gallery, while the new palace, if it were only what it ought to be, would be a great additional ornament to the gardens and the park. And, besides our gallery, we have two other great works, which every one is anxious about—the quays of the river and the approaches to our Houses of Parliament.

If the quays were only constructed as they ought to be, London would be the most magnificent city and the most agreeable residence in the world.

I have the honour to be, Sir,
your obedient servant,
JOSEPH KAY.

Paris, Hotel Meurice, Oct., 7.

SCHOOL OF INDUSTRIAL ART, CALCUTTA.

[From the *Friend of India*, August 24.]

The example of Dr. Hunter at Madras has been followed in Calcutta, and the School of Industrial Art is now in full operation. The narrative of the progress of the undertaking will display at once its utility, and the minute practical difficulties which impede all such enterprises in India. Early in the present year, Mr. Pratt, Under-Secretary to the Government of Bengal, determined to carry into execution a plan long since matured. The project was to establish an institution, which should be at once a school of design and a laboratory, where experiments could be made for mechanical improvements. In England a few speeches would have been made, and a few articles written, and if funds had been forthcoming, the school would have marched at once. In India it is far otherwise. The money difficulty is of trivial importance. Calcutta is always ready to give, and any man of reputation can always collect any sum required for a philanthropic object. There remain a host of petty practical difficulties, which must be removed one by one by the personal efforts of the projectors, those projectors being in almost all cases men weighed down by business. It was resolved to begin by teaching drawing and modelling. It was necessary to find teachers. In England a philanthropist oppressed by that difficulty would put an advertisement in the *Times*. In Calcutta, he must wander about everywhere, pester all his friends, endure coldness and insouciance with immoveable good temper, and succeed, if he does succeed, by dogged pertinacity. In the present instance, by unusual good fortune, teachers were obtained. M. Augier was engaged at a salary of 120 Rs. to teach the elements of drawing. A Belgian artist, of considerable ability, also offered to teach the first principles of modelling, without remuneration. His offer was of course gratefully accepted, and the committee secured also a native modeller, who is remarkable for his skill in taking likenesses, and who has been employed to model the couchant lions in front of Government House. So far all went well, but there remained two great difficulties, curiously trifling in themselves, but illustrative of the state of Indian society, and the exactions of philanthropy from individual energy. Modellers need for their work plaster of Paris and instruments. There is more plaster of Paris in India than in the department of the Seine, but no one knew where to look for it; there was

none in Calcutta, and, even if discovered, the facilities of transport were more than doubtful. It was proposed to import it from England, from China, from Madras, but at last we believe it has been obtained in the Rajmehal Hills, sufficiently near the river for easy transport. Then came the instruments. Calcutta turns out some of the finest jewellery in the world. Its workmen complete those exquisite works in inlaid ivory, which Europeans, ignorant of the secret of their construction, believe to be marvels of patient labour. Nobody, however, could make a spatula. Trial after trial failed, and the founder of the School, after organizing committees, raising funds, corresponding with half India, and rousing an apathetic community, found himself obliged to hunt the bazaars for some one who could tell a "true" from an imperfect instrument.

All difficulties gave way to pertinacious energy. Teachers were obtained, materials were discovered, and even the ivory knives were set right. Casts were promised from Somerset house, and an engraver will ultimately be imported from England. It remained to obtain scholars, and to their delight, the Committee found their exertions scarcely required. The passion for instruction, which is perhaps the most marked, as it is certainly the most hopeful feature in the Bengalee mind, overcame the dread of personal exertion. Natives of the highest class were found ready to toil with their hands, and to descend to labours hitherto considered menial. The hours were arranged so as to allow of their attending the classes after school, and when the Institution opened, besides eight and twenty East Indians, it numbered dozens of natives. Among them were eleven Bramhuns. Time will show the degree of success to which natives can attain in these departments. It is certain, however, that they have produced works displaying considerable sense of beauty. If the doctrine of the Pre-Raphaelites, that Art is the perfect imitation of nature, be correct, the imitative faculty of Southern Asiatics should be greatly in their favour, while the popular idea that Bengalees are deficient in imagination rests upon no proof, and is opposed to many recorded facts. We may never see a Bengalee Canova. A Bengalee Callot or Fuseli is more than a possibility.

Nor has the purely industrial portion of the School been forgotten. Experiments in brickmaking, and improvements in all kinds of clay manufacture, are rapidly progressing. It is hoped that the School will create an entirely new description of pottery, and that this article, which is always in demand, will be furnished to the people in forms that must induce new ideas of refinement. Strange to say the potters will not enter the School. They are embarrassed by the necessity which fetters education in the manufacturing districts of England. Their work is purely mechanical, it is in incessant demand, it scarcely tasks the muscles, and the children can earn wages so easily that their parents will not give them up. The work must be done, and the information acquired, by men who could scarcely touch a potter, yet there seems every probability of ultimate success. The lads are diligent, the interest of the natives is strongly excited, there are funds in hand, and the Industrial School may be considered fairly in operation.

We have purposely abstained from drawing any deduction from these facts. Our object has been to narrate, and not to moralize, but not the less do we believe the success of this School an important step in advance. Perhaps the greatest evil in native society is the belief that labour is dishonourable. An English gentleman is always moving, and thinks himself as little disgraced by working at a lathe as by experiments in the laboratory. A Bengalee gentleman sits. He does nothing else, and to awake him from this physical apathy is in its way almost as important, and far more difficult, than to arouse his intellectual powers.

THE UNITED STATES MINT.

(*From Professor Wilson's Special Report, New York Industrial Exhibition.*)

In visiting the Mint at Philadelphia* I had the advantage of being taken through the several departments by the chief coiner, Mr. Franklin Peale, and the melter and refiner, Professor J. C. Booth, who kindly furnished me with the following details of their operations. As the gold is brought to the Mint in various quantities and in a crude state, it passes necessarily through the department of the refiner before it reaches that of the chief coiner; I therefore give the actual details of the refining operations upon sundry deposits of gold, amounting in the aggregate to 2,000,000 dols.

The deposits are immediately weighed and a certificate of their gross weight issued. The fires having been lighted in the five furnaces of the deposit melting-room at four or five o'clock, A.M., all the deposits, amounting perhaps to seventy or eighty, are melted before noon; assay slips are then taken off and the assays finished the next morning, after which their values are calculated by the weight after melting, care being taken to include all the grains that can be procured from the flux, pots, &c., by grinding them up under a pair of small chasers, sifting, and washing. There is a clerk and his assistant and one hand wholly engaged in performing all the weighings for the treasurer, such as weighing deposits before and after melting, ingots for coinage, fine bars, and the clippings after cutting out the planchets. There are five men in the deposit melting-room, two of whom attend to two furnaces each at the same time, one to one furnace and washing grains, and the remaining two are labouring assistants. The whole deposit of 2,000,000 dols. is melted in three or four days in the deposit-room and assayed by from the third to the seventh day.

As soon as the first deposits are assayed, say on the third day (if expedition is necessary), or always on the fourth, they are granulated in the proportion of one part of gold to two parts of silver. The pots contain 50lbs. of gold and 100lbs. of silver, equal to 1,800oz., and each melt requires about an hour. With four furnaces (attended by four melters and two aids) there are ordinarily made thirty-two melts per day, but when hurried, forty-eight melts can be made, making from one-third of a million to one-half of a million dollars per day. Two days' work, or about 650,000 dollars' worth of gold, equal in weight to one ton (avoirdupois weight), are granulated for a single setting with acid. The granulated meal is charged into large pots, together with pure nitric acid of 39° Beaumé, between the hours of seven and nine A.M. on the sixth day, and steamed for five hours. The pots, made in Germany, are two feet in diameter by two feet in depth, and set in plain wooden vats, lined with 8-16ths. sheet lead; a single coil of copper pipe passing around the bottom of the vats below the steam directly into the water in which the pots are set, to about half their depth.

The vats are arranged in the small house in the middle of the room, with a large flue connecting with the chimney-stack, so that when in action the odour of nitrous fumes is scarcely perceptible in the building. The 2,000,000 dollars require about sixty such pots; they are stirred about once each hour, say altogether five times, with simple wooden paddles; the next day (seventh) the acid solution of nitrate of silver is drawn off by a gold-syphon into wooden buckets, and transferred to the large vat, in which it is precipitated by salt (chloride of sodium), and fresh acid added to the metals, now containing very little silver. Steaming for five hours on the seventh day completes the refining of 650,000 dols. Early on the

* In addition to this, which is the head establishment, there are also three branch mints at New Orleans, at Charlotte, and at Dahlonega. The two latter coin gold only; that at New Orleans, gold and silver.

eighth one pot is drawn off, washed with a little warm water, and the gold-powder transferred to a filter. Fresh granulations are then put into this empty pot, and the acid of the adjoining pot baled over upon them, and thus through the series, the whole being re-charged in from two to two and a-half hours. After steaming for five hours, the acid which contained but little silver from the preceding day becomes a nearly saturated solution of nitrate of silver. By this arrangement 4½lbs. of nitric acid are consumed altogether for each pound of gold refined, and the latter is brought up to 990 at 993 m. fine;—rarely below 990. Thus every two days 13,000lbs. of nitric acid are used. In the course of last year 1,000,000lbs. of pure nitric acid, at seven cents per pound, equal to 70,000 dollars were consumed.

The gold is washed with hot water on the filter during the eighth day, and until it is sweet (say by 7 p.m.) The filter consists of two layers of tolerably stout, coarse muslin, with thick paper between, in a tub with a false bottom, 2½ feet in diameter and 2½ feet deep, and mounted on wheels. One of the men remains, after washing hours, until 7 p.m., when the watchman of the parting-room continues washing the gold and silver until sweet, *i.e.*, until the wash-water ceases to colour blue litmus paper. Early on the ninth day the wet gold is pressed with a powerful hydraulic press, and the cakes then thoroughly dried on an iron pan, at a low red heat. This process saves wastage in the melting-pot, since there is no water remaining in the pressed metal to carry off gold in its steam. The same day (ninth) the gold is usually melted with a less proportion of copper than is requisite to make standard metal, and cast into bars, which are assayed by noon on the tenth. They are then melted with the proper quantity of copper, partly on the same day, partly early on the eleventh, and assayed and delivered to the coiner the same day. On the fourteenth they are ready for delivery to the Treasurer as coins.

The silver solution drawn off from the pots is precipitated in a large wooden vat of 10 feet diameter by 5 feet deep, and the chloride of silver immediately run out into large filters [6 × 3 × 14] where it is washed sweet. The filter is covered with coarse muslin, and the first turbid water thrown back; the filter, which is on wheels, is then run over to the reducing vats, and the chloride shovelled into them. There are 4 such vats [7 × 4 × 2] made of wood and lined with lead, 1 inch thick in the bottom. A large excess of granulated zinc is thrown on the moist chloride in the vats, without the addition of acid; the reduction is very violent, and, when it slackens, oil of vitriol is added to remove the excess of zinc. The whole reduction occupies a few hours, and after a night's repose the solution of mixed sulphate and chloride of zinc is run off into the sewer.

About two tons of zinc per 1,000,000 dollars of gold are employed; the silver, however in this amount, say 10 per cent. by weight, should only take, by equivalents, about 2,400 lbs., so that nearly two equivalents of zinc for one equivalent of silver are used. This is found to be advantageous, as both time and space are greatly economised by this excess.

The day after the reduction the reduced silver is washed, and the second day it is pressed and dried by heat, the same hydraulic press as for gold being used, but with different drying pans. The same silver is used again for making fresh granulations, but as it accumulates from the Californian gold, 10,000 or 20,000 ounces are now and then made into coin, great care being taken in this case to avoid getting gold in it when drawing off the silver solution, and in the press.

Such are the actual working details in refining a specified amount (2,000,000 dols. of gold), the first third of which is delivered as coin in 14 days after its arrival, and the third-third in 18 days.

But as there is a bullion-fund of 5,600,000 dollars allowed by Government, depositors are paid from the third to the fifth day after an arrival, *i.e.*, as soon as the gold is melted, assayed, and its value calculated. When two heavy arrivals occur in close succession, the time of refining and coining can be shortened from fourteen to ten days.

The number of men engaged in the refining department is 14: 1 foreman, 8 for the parting process, 3 for reducing, and 2 for pressing and drying. In the gold melting room there are three melters and two assistants. The total number of hands in the melting and refining departments is 34, including a melting and parting foreman, and three in the place for grinding, sifting, washing, and sweeping. This last place or sweep embraces all pots, ashes of fires, trimmings of furnaces, ashes of all wood work, &c., &c.

The late law for reducing the weight of silver coin necessitated an increase of force, and 15 more were in consequence employed for this purpose. While 50,000,000 dols. in a year have been parted with the above force, they could with the same force and apparatus refine 80,000,000 dols. if it were required.

After many experiments upon anthracite, Professor Booth stated that he had at length fully succeeded in employing it for melting both gold and silver in the same furnaces, slightly modified, in which he had been accustomed to melt with charcoal. This change had been accompanied by great economy in the cost of material and labour, and by greater comfort to the workmen, from their being less exposed to heat. The cost of charcoal (of the best quality—hard pine-knot coal) is 16 cents per bushel, delivered at the Mint; and while the cost of this fuel for all their operations in 1852, when gold was chiefly refined and melted, was about 7,000 dols., the cost of anthracite will be from 600 dols. to 1,000 dols. In using the anthracite he found that a simple draft of air, without a blast, was quite sufficient to sustain combustion.

Californian gold frequently contains the alloy, iridosmine, which is not always detected by the assay. In order to remove it as far as possible without actually dissolving gold, it is allowed to subside first in the granulating crucibles, and then in the crucibles for toughening (melting fine gold and copper). If the assayers report its presence in the toughened bars, they are again melted, and the iridosmine allowed to subside. By these three, and often four successive meltings, the gold is separated from its troublesome companion as far as practicable. The gold thus refined, and reduced to the proper standard is delivered over to the chief coiner in the form of bars or ingots of a certain weight, to be divided and shaped into pieces required for the currency of the country.

The *coining* department of the establishment is of a power and efficiency sufficient to perform all the mechanical processes incidental to the issue of nearly 70,000,000 of pieces during the past year; and I was assured by Mr. Franklin Peale, the chief coiner, that it could have executed much more if it had been steadily employed, or fully supplied with material during the whole of that period. It is not necessary to go through the whole course of operations in this department, but to notice only such as possess novelty or present special characteristics.

The necessary power for working the machinery is obtained from a large steam-engine of the form usually known as the steeple-engine; it is a double vertical high-pressure engine, with cranks at right angles, the power being carried off by a caoutchouc belt, two feet wide, from a drum of eight feet in diameter; the estimated power is equal to 90 horses. At times this is all required, at others much less is sufficient, and in uncertain proportions; to meet this irregularity, and to insure that steadiness of motion so necessary in such delicate operations, a governor and throstle valve of a peculiar construction have been devised which have now been in use for some time, and have produced most satisfactory results, fully effecting the purpose for which they were designed. The rolling mills, 4 in number, are driven entirely by belts, at the rate of 6 revolutions per minute; the distances between the rollers

being adjusted by double wedges, moved by a train of wheels which are connected with a dial plate and bands, divided and numbered into hours and minutes, so as to indicate the proper thickness of the strips of metal without the use of guages. Gold strips are heated in an iron heater by steam, and waxed with a cloth dipped in melted wax, and silver strips are coated with tallow by means of a brush. The draw bench is used for both metals, and trial pieces are cut from every strip and their weight tested preparatory to the cutting of the whole.

The cutting processes are very simple and efficient, consisting of a shaft moved by pulleys, and a 2½-inch belt, with a fly-wheel of small diameter, but sufficient in momentum to drive the punch through the slip of metal by means of an eccentric of three-eighths of an inch, at the rate of 250 pieces per minute, which skilled hands can readily accomplish and continue until the slip is exhausted. The annealing during the rolling of the ingots into slips is performed in copper cases, in muffles of fire-clay and brick, heated by anthracite coal, three muffles or hearths being kept at a bright red heat by one fire-grate or furnace, and the distribution and intensity regulated by dampers. These annealing furnaces are recent in their construction and very satisfactory in operation; they are heated by anthracite at the cost of about one-fourth the expense of the wood previously employed.

The whitening of planchets is performed as usual by inclosing the gold in luted boxes, and by exposing the silver in an open pan, to the heat of a simple furnace with wood fuel; the drying and sifting after the action of dilute sulphuric acid, is rapidly and effectually accomplished by a rolling screen—one portion of which, consisting of a pair of closed concentric cylinders, between which high-pressure steam is admitted. The blanks, with a sufficient quantity of light wood sawdust (linden or bass wood is the best), being introduced into the interior cylinder, a revolving motion is given to it by the engine for a certain time; the door is then opened, and the blanks and sawdust gradually find their way into the wire screen by which they are separated, the movement being continued until the separation is complete, when the blanks are discharged at the end of the machine. An arrangement exists by which a slight inclination is given to the machine so as to direct the motion of the blanks towards the discharging end.

The milling machines are, I was informed, peculiar to this mint, and are in a great measure original, the operation being performed by a continuous rotary motion, with great rapidity and perfect efficiency, varying in rate according to the denomination of the coin, between 200 and 800 pieces per minute, and at the same time separating any pieces that are notably imperfect.

It must be understood that the operation there termed "milling," is merely for the purpose of thickening and preparing the edge, so as to give a better and more protective border to the coin, the ornament or reed, commonly known I believe in this country as "milling," being given to the piece by the reeded collar of the die in which the piece is struck.

The coining presses, 10 in number, and milling machines are worked by a high pressure horizontal steam-engine, made from the design and under the direction of the present chief coiner, in the workshops of the establishment in 1838.

The presses are of three sizes, the largest applicable to the striking of silver dollars and double eagles, the second to pieces of medium value, and the smallest to the dime, half dime, and 3 cent pieces. The first is usually run at the rate of 80 per minute, the last at 104 per minute,—the average rate of the whole is 82 per minute. This rate can be increased if required.

If all the presses were employed in coinage at the usual rate, they would strike in one day (9 working hours) 439,560 pieces, and if employed upon gold, silver, and copper, in the usual manner, and on the usual denomination of coin, they would amount in value to 966,193 dols.

During the past year, on one occasion 8 of the presses were run 22 out of 24 consecutive hours, and coined in that time 814,000 pieces of different denominations of coin.

These presses have been made principally in the workshops of the Mint. They possess in common with the presses of Uhlhorn, in Germany, and Thouellier, in Paris, the advantage of "the progression lever," "le genou" or "toggle joint," a mechanical power admirably adapted to this operation; but in almost every other particular they are original in arrangement, being the result of experience, beginning as far back as 1836.

In order to supply these presses various means have been devised; among them, and not the least important, is the "shaking box," in which advantage is taken of a disposition observable in similar bodies, or bodies of similar form, to arrange themselves in similar positions. This is a box, whose bottom is constructed with parallel grooves adapted to the size of the blanks or planchets to be arranged. A quantity of them is thrown indiscriminately into the box, which is then quickly shaken in the direction of the grooves, the pieces immediately lay themselves side by side in parallel rows, from which they can easily be lifted in rouleaux as required to be passed to the feeding tubes of the mills or presses.

It is very evident to all visiting the establishment that such a large number of pieces could not be coined and manipulated by such a limited number of hands without the aid of some labour-facilitating arrangements, one of the most worthy of remark of which is the method of counting the pieces coined—if counting it can be called, for in principle it is a measuring machine. The arrangement of this counting frame, or tray, may be understood from the following sketch of its construction.

A board or tray of such dimensions as may be required, is divided by a given number of parallel metallic plates dissected into its plane and slightly elevated above it, the edges of which rise no higher than the thickness of the coin for which it is intended. The board is of such a length as will admit of a few more than the required number of pieces to be laid longitudinally in the rows, and is divided across and at right angles with the rows, and hinged at a point opposite to a given number. One of those employed by this department counted 1,000 pieces, that is to say, it had 25 parallel grooves or rows sufficiently long to receive 45 pieces. Now, having thrown on this board a large excess of pieces, it is agitated by shaking until all the grooves are filled, and then inclined forwards until all the surplus pieces have slid off, one layer only being retained by the metallic ledge; the hinged division is then suffered to fall, which at once throws off all but the 45 pieces in the length of each row. This operation, somewhat difficult and tedious to describe, is performed in a few seconds, and results in retaining on the board 1000 pieces, each piece exposed to inspection, and the whole accurately counted without the wearisome attention—so likely to result in error—required under usual circumstances.

The very large number of pieces coined during the last year has been counted almost exclusively by two female manipulators, assisted by a man who had the duty of weighing them in addition as a testing check. The same amount of labour by ordinary means could not have been performed with fewer than thirty or forty hands, to say nothing of inferior accuracy. This machine was originally arranged and patented by the late R. Dyler, coiner of the New Orleans Branch Mint, but has been materially improved in its application and construction by Mr. Franklin Peale of Philadelphia.

Home Correspondence.

SEWAGE MANURE.

Sir,—The letter in your last week's Journal signed S. S., on the subject of sewage manure being somewhat severe on Mr. Wicksteed, will you allow me to inform your readers how it was that his report came to be noticed by you. On the occasion of your visit to our works, I suggested these sewage matters as a good subject for a paper next session, and gave you Mr. Wicksteed's report to read. I must therefore take the responsibility of having been the introducer of the "mere advertising puff," and can only plead in excuse, that it was not before I had, in company with an able agriculturist, visited Mr. Wicksteed's works at Leicester, had seen his process in operation, and believed, as I still believe, that it is a successful one, and that some process of this class, some process which, by separating the manure fresh in a portable state, will change the sewer water from a poison into a source of gain, will alone bring about a good general system of drains, which even cholera has failed in, if we may judge from this neighbourhood, where a great sewer called the river Effra, still uncovered, runs its offensive and poisonous course, and New Manor-street, in the Old Kent-road, where the sewer ditches still smell abominably and blacken the paint on the neighbouring houses, by the sulphuretted hydrogen, the deadly poison, they give off.

I am, Sir, yours truly,
GEORGE F. WILSON.

Belmont, Vauxhall, Oct. 23, 1854.

THE FIBRE OF THE BOKHARA CLOVER.

Litherland, Liverpool, 20th October, 1854.

Sir,—I enclose herewith, and must trouble you to place in the hands of the proper Committee, a small sample of twine roughly made from the fibre of the *melilotus leucantha major*, known as Bokhara clover. The plants from which this was made were grown by my relative, Mr. William Hope, at his residence near this town, and attained a height of ten to twelve feet.

The opinion of Messrs. Ackerley and Co., ropemakers, here—gentlemen well able to judge in such matters—is that the fibre is remarkably strong, and that if cut at the proper season, and carefully worked, it might prove of great value.

Should it be found that the leaves, which are relished by stock, can be stripped for fodder without injury to the fibre of the stalk, it will materially facilitate its profitable cultivation, and may make it of national importance. The plant matures its seed well in this country, Mr. Hope having grown it with success from the seed saved two years before.

Yours, &c.,
T. RADFORD HOPE.

P.S.—I send by parcel to-day a few stalks and some seed of the above plant.

THE CAHOUN OIL OF BRITISH HONDURAS.

Belize, September 17th, 1854.

Sir,—I received your Journal of the 4th of August, and read with great satisfaction the favourable report of the General Manager of the British Sperm Candle Company, respecting the cahoun oil of British Honduras. The experiment has been made, and it has been clearly ascertained that the cahoun oil is better adapted to the formation of candles than the oil of the cocoa-nut. Now, the public have a right to be supplied with the best article which can be procured, hence it follows that the public will demand, and that demand *must* be complied with, candles made of the cahoun oil. But the question will necessarily be asked, and pressed, is there a sufficiency of the article to render it worth the while of a company, or an individual, to undertake to any extent the manufacture of this oil for the European markets? In answer to this, I have already said that the country is covered with cahoun trees, and that in every part of the settlement there are navigable rivers and creeks by which the manufactured oil, or the raw material, could be conveyed at a very small expense to the port of Belize. But *supposing* that there were not sufficient nuts to supply the great demand which would instantly arise in all quarters for this useful oil, I may state to you that a hundred square miles could be planted with cahoun trees in a month, which in the course of seven years would be in full bearing.

I will suppose that the British Sperm Candle Company, or some other company, should be disposed to undertake the manufacture of this oil on a large scale. What would be the proper course to pursue? Machinery would be required. Machinery first to crush the nut, and, secondly, to express the oil. A steam-engine of one or two horse-power would be desirable. There are wood and water everywhere. The next point to be considered would be, where should the works be established? There might be separate works on the various rivers near to which the trees grow in abundance. But I think the most economical plan would be to have the works at Belize, and to bring to that port, by means of a small schooner, from the different rivers the nuts which should have been previously conveyed to their mouths in boats. The navigation from one river to another is perfectly safe, for the sea along the whole coast of British Honduras may be said to be a natural harbour. This is caused by a succession of coral reefs, which extend along the whole distance, and act as a breakwater, keeping the sea which lies between them and the land comparatively smooth.

In gathering the nuts very little labour would be required. This operation might be as well performed by women and children as by strong able-bodied men.

The cahoun oil *must*, when it becomes more generally known, supersede for many purposes the cocoa-nut oil, to which it is so much superior. The character, and, if I may so express myself, the habits of the two trees are essentially different. The cocoa-nut tree is always seen growing along the sea coast, where the soil is swampy, or sandy, or altogether sand, but it is never found in the interior of the country, unless it has been there planted. The cahoun tree, on the contrary, is never found on the sea coast, but is only to be seen growing in the richest soil from 15 to 20 miles in the interior. I am not able to say whether this fact will account for the oil of the latter tree being so much superior to that of the former.

I think it would be perfectly legitimate for any company proposing to enter upon this undertaking on an extensive scale, to make application to the government for certain privileges as an encouragement to their efforts. The crown lands in this settlement are very considerable, and it might not be thought perhaps an unreasonable request to be allowed the exclusive privilege of gathering the nuts which grow upon such lands, for it cannot be denied that a source of wealth would be developed by their endeavours and by the employment of their capital, highly beneficial to the colony itself and to mankind.

I will take an early opportunity of procuring some young cahoun trees, and I will forward them to you in order that they may be sent to the Crystal Palace Company.

Yours, &c.,
R. TEMPLE.

THE ROOM DYE OF ASSAM.

Sir,—I beg leave to bring to the notice of the Society of Arts, on behalf of the Agricultural and Horticultural Society of India, some specimens of the room dye of Assam and of cloths dyed with it. This dye is obtained from a species of Ruellia,* which is very common throughout Assam. It dyes a very black permanent blue. It is supposed that it might be made useful as the first colouring matter used in dyeing black cloths; and it would be

* I am not aware of any other plant of the same family, *Acanthaceæ*, as the *Ruellia* affording a dye.—A. H. B.

very desirable if the Society of Arts were to undertake to have some experiments made with cotton and woollen, or silk cloths for this purpose. If musters so treated, with an account of the processes used, were sent to the Agricultural and Horticultural Society of India, they would be submitted to the Government officers in Assam, with the view of having local use made of them.

The dye in question has been several times brought to the notice of the Agricultural and Horticultural Society by Colonel Jenkins, Commissioner of Assam, and by Major Vetch, the Deputy Commissioner. The former officer states that all the jackets of the Shans, Singphors, and other tribes are dyed with this article; and that the consumption of it in this way is very great, as these dark dyed stuffs are in universal wear.

The following is Major Vetch's account of the mode pursued by the hill tribes of Assam in applying the "Room":—

"Dissolve the dye in water, filtered through wood ashes, and allow it to stand exposed to the sun for 4 or 5 days. Then steep the cloths, or articles to be dyed, as often as may be requisite to obtain the shade desired: wash in cold water and dry: and to fix add to the dyeing material fermented rice-water, in which again steep the article as long as may be found requisite (say a day and night), and then put out to dry, when the operation is complete."

The specimens submitted with this letter are:—

No. 1. Room dye obtained by the native process without boiling.

No. 2. Room dye obtained by the same process as that employed in making Indigo.

No. 3. Two pieces of cloth dyed with the above-named article.

No. 4. Two pieces of cloth and wool dyed with the same article.

These pieces of cloth and wool may perhaps be employed to test whether the dye in question is likely to be useful as the ground for a black dye.

I may add that a muster of this dye, made after the native fashion, was estimated in 1851, by an indigo broker in Calcutta, as worth about twenty rupees per maund (£2 for 80 lbs.); he pronounced it only equal to what is called "washings" of a rather inferior quality. He had not an opportunity of seeing any made after the same process as that employed in making indigo; but I have been informed by Major Vetch, in a recent communication, that some specimens, so prepared, and sent to this country, have been highly approved of. These specimens have been prepared under the superintendence of a gentleman who is now settled in Assam, and engaged in cultivating the plant, which it appears grows readily from cuttings, as well as from seed.

I am, Sir,
Your obedient servant,
A. H. BLECHYNDEN.
Sec. A. and H. Soc. of India.

76, Ebury Street, Pimlico,
October 20th, 1854.

To the Secretary of the Society of Arts, Adelphi.

Proceedings of Institutions.

Bury, Lancashire.—On Friday, the 13th of October, the first of a course of twelve lectures on "Ancient History," was delivered at the Athenæum, by the Rev. John Wright, B.A. The rev. lecturer introduced his subject by stating the various methods of studying ancient history, suggesting, as his opinion, that the best method was by classing the parallel progress of the several nations in the history of the world into ages, as the youth, manhood, decline, and extinction of the nations which had held successive sway in ancient times. This course was followed by another, on Friday last, the 20th instant, on "Natural History," by Adam Fletcher, Esq., M.R.C.S. The lecture was introduced by instancng the great want of a knowledge of natural history, in its various departments, in the upper as well as the lower ranks of society; not omitting to mention that there were many bright examples to the contrary, and those, too, in the class strictly denominated working men. The lecturer concluded by stating that he would confine himself to the zoological part of his subject, and, at some future time, the other sections of natural history might be introduced. These two courses of lectures are designed by the directors to be what may be strictly termed class lectures, to those members of the Athenæum who are anxious to study either of the subjects, separately or combined. The attendance was quite as numerous as the directors anticipated, and the introductory lectures gave great satisfaction.

Great Yarmouth.—The first annual meeting of the Parochial Library and Museum was recently held in the Priory Library and Reading-room, the Rev. G. Hills, minister of the parish, in the chair. The Rev. C. Smyth, the hon. secretary, read the report, in which the committee expressed their satisfaction at the successful result that had followed their appeal for the establishment of the Parochial Library. The number of books in the library is 2312, being an increase of 254 since Oct., 1853. The estimation in which they were held might be judged from the fact that no less than 4656 volumes had been issued to the subscribers during the year. If to this be added the circulation of the Book Club, 3172, it would show a total issue, during the year, of 7828 vols. Some books had taken been out many times; thus the History of England 10, Josephus 9, Knight's London 31, Experience of Life 15, Leisure Hour 23, Illustrated Exhibitor 23, Margaret Catchpole 40, Ivanhoe 21. In the Reading-room during the year the attendance of members had varied from nine, the lowest number, to as many as fifty-four of an evening, showing an average attendance of twenty-eight. The Book Club during the year has had sixty-one subscribers. To the Museum about 500 contributions have been made. The whole are deposited in glazed cases. The birds already number more than 100 specimens, which have been carefully arranged by W. Fisher, Esq. A course of 16 lectures was delivered during the winter months. The Mutual Improvement Society had been highly satisfactory. Free instruction in reading, writing, and arithmetic, had been given in the Priory Hall two evenings a week. The number of young men of the working-classes who attended these was 118, some of whom have made considerable progress. The balance-sheet showed an expenditure of £245 0s. 11d.; receipts, £244 6s. 1d., leaving a balance due to the treasurer of 14s. 10d. The Report having been adopted, Mr. Sayer, one of the members, offered to form a French class, which was accepted. A vote of thanks was then passed to the chairman, and also to the honorary secretary, the Rev. Mr. Smyth, which were duly acknowledged, and the meeting separated.

Newcastle-on-Tyne.—Mr. Thornton, the Secretary of the Northern Union of Mechanics' Institutes, has received from Colonel the Hon. C. B. Phipps, the following letter:—"Balmoral, October 4, 1854.—Sir,—I have now the pleasure to forward to you, by command of his Royal Highness the Prince, a present of books for the Northern Union of Literary and Mechanics' Institutes. His Royal Highness hopes that these books may be freely circulated, and trusts that they may prove not only amusing, but instructive and morally useful.—Yours, &c., C. B. Phipps."

Salisbury.—A very important meeting of the Hants and Wilts Educational Society was held on Thursday last, in the Council Chamber, Salisbury, Major-General Buckley, M.P. for Salisbury, President of the Salisbury Institute, in the chair, to which all the Institutions in the two counties, in union with the Society of Arts, were invited to meet in conference. It was responded to by the attendance of the representatives of many of the most important Institutions in Union; and, though not fully attended by those who

might have been expected to take an interest in the objects of the Society, included many of the most active and most influential labourers in the great cause of education from the neighbourhood, and, indeed, from a considerable distance round. Amongst those present were Lord Ebrington, Chairman of the Council of the Society of Arts; Mr. Harry Chester, Professor Moseley, Hon. and Rev. Samuel Best, Rev. Newton Smart, John Ravenhill, Esq., E. E. Kelsey, Esq., Rev. Messrs. Earle, Scott, Bynd, Compton, Walters; Wyndham Portal, Esq., E. W. Faithful, Esq., Dr. Welsh, Messrs. Bennett, Lush, Tiffin, Brodie, Fox, &c. The report, which was read by the secretary, stated that the plan of mutual assistance in the delivery of lectures at village reading-rooms had been arranged for the present season for a union of five parishes, of which Stockbridge is the centre. The same principle has been adopted in other places, but has not been so fully and successfully carried out. To facilitate the delivery of lectures in towns a list of gratuitous lecturers had been circulated. The next point was to diminish the expenses incurred by lecturers and by Institutions in providing diagrams and apparatus. For this purpose a depôt was formed at Winchester, which now contains thirty-two sets of diagrams, besides a lantern and microscope, with natural history, botanical, and astronomical slides; and the Society is about to purchase others, on a large scale, which the Department of Science and Art, Marlborough House, has produced. The list of Institutes in Union includes thirty-seven Institutions and Reading-rooms, six of which are in direct union with the Society of Arts. The treasurer's report shows a balance of nearly £100 in hand, but a considerable portion of this, arising from donations, will not be renewed. After the reading of the report the meeting proceeded, by way of conference, to discuss—1st. The subject of libraries and reading-rooms. 2nd. The purchase of books on the terms of the Society of Arts. 3rd. The examinations proposed by the Society of Arts for the members of its associated Societies; and, 4thly, the issue of diagrams from the Depository. Much valuable information was given under each of these heads, in reply to questions, by Lord Ebrington and Mr. Chester. There is every reason to hope that the cause of the Society, and the education of the people connected with it, will have been largely promoted by the meeting.

SEVENOAKS.—In accordance with the resolutions contained in the Report of last year, the committee of the Literary and Scientific Institution have determined to offer the sum of five guineas (in books, to be selected by the successful competitors), to be awarded in the following manner: To the best essay upon "The Knowledge most useful to the Working Classes; and the Best Method of acquiring it." First prize, 40s.; second prize, 20s. For the "three best abstracts of two-thirds of the lectures delivered at the Institution, from January 1st to November 30th, 1854." First prize, 20s.; second prize, 15s.; third prize, 10s.

WESTMINSTER.—On Tuesday evening, the 19th ult., the winter session of the Literary, Scientific, and Mechanics' Institution was opened, and the lecture delivered was by Dr. Cantor, on the "Phenomena of Sleep, including Dreaming, Somnambulism, Apparitions," &c. The attendance of the members was more than usually numerous, and the mode of treating the subject adopted by the lecturer evidently afforded the audience much gratification. The matter was placed before them in a strictly logical and scientific manner, and rendered intelligible to all by the very apposite and striking illustrations adduced.

MEETINGS FOR THE ENSUING WEEK.

WED. Geological, 8. 1. Dr. Rubidge, "On the Occurrence of Gold in South Africa. 2. Mr. W. Bray, "On the Occurrence of Copper in Tennessee. 3. Mr. J. W. Dawson, "On the Occurrence of a Reptilian Skull in the Coal at Picton."
FRI. Botanical, 8.
SAT. Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS WITH COMPLETE SPECIFICATIONS FILED.

[*From Gazette, Oct. 20th*, 1854.]

2173. P. E. Proust, Orleans—Lubricating axles. (11th Oct. 1854.)
2174. J. F. J. A. Boullet, La Chapelle St. Denis, near Paris—Steel. (11th Oct. 1854.)
2196. A. B. Baron von Rathen, Wells street—Bakers' and confectioners' ovens. (14th Oct. 1854.)
2223. R. J. Chippendall, 39, Rue de la Rochefoucauld, Paris—Pencil case. (17th Oct. 1854.)

WEEKLY LIST OF PATENTS SEALED.

Sealed October 20th, 1854.

920. William Harcourt and Joseph Harcourt, Birmingham—Improvements in chamber or flat-bottomed candlesticks.
92.. Henry Bernoulli Barlow, Manchester—Improvements in manufacturing metal nuts, and in machinery for stamping, forging, and punching the same.
932 Charles Emilius Blank, Trump street—Improvements in winding or reeling yarn into hanks.
946. William Collier, Weston, Chester—Improvements in evaporating pans for concentrating solutions of certain acids, alkalies, and salts.
952. Edward Crosland, Rochdale, and Thomas Boardman, Westhoughton—Improvements in weaving, and in machinery for manufacturing cut pile and other fabrics.
956. John Henry Johnson, 47, Lincoln's inn fields—Improvements in polishing and flattening metal plates. (A communication.)
985. Carlo Minasi, Brecknock place, Camden town—Improvements in apparatus for hatching eggs, and for raising or rearing the young when first produced.
988. Désiré Plisson, Paris—Improvements in chemical condensing apparatus.
1002. John Manley, Chacewater, Cornwall—Improvement in ventilation and in treating smoke, so as to prevent the ascent of the denser particles thereof into the atmosphere.
1044. John Anthony and William Treeby Chafe, Devonport—Improvement in machinery for the manufacture o pipes and tubes from lead and other soft metals and alloys.
1103. Jonathan Worthington, Collieries, near Cardiff, and Fennell Allman, of 9, Adam street, Adelphi—Improvements in boring, mining, and blasting, and in the apparatus connected therewith.
1210. Léon Isidore Molinos, and Charles Pronnier, Paris—Improvements in locomotive steam-engines.
1282. Arthur Llewellyn Dawson, Southwark Bridge road—Improvements in machinery for cutting and shaping wood.
1323. John Rawe, jun., Haverstock hill—Improvements applicable to stoves, stove-grates, or fire-places for domestic use.
1351. George R. Chittenden, Wood street—Improvements in sewing machines.
1490. Nicholas Michael Caralli, Glasgow—Improvements in the manufacture or production of ornamental fabrics.
1638. James A. Cutting, Boston, U.S.—Improved process of taking photographic pictures upon glass, and also of beautifying and preserving the same.
1694. William Edward Newton, 66, Chancery lane—Improvements in the construction of repeating fire-arms.
1706. Charles Tetley, Thurlow villas, Dulwich—Improvements in rotatory engines to be worked by steam or water.
1732. Thomas Waterhouse, Sheffield—Improvements in machinery for cutting files.
1774. Joseph Beardmore, jun., Stowage, Deptford—Improvements in supplying air to furnaces.
1780. John Coupland, Southampton—Preparation and manufacture of a pulp to supersede the use of rags and similar fabrics in the manufacture of paper.
1842. William Hunter Meriwether, Morley's Hotel, Strand—Improvements in the construction of fences and hurdles.
1848. Charles Blunt, Sydenham, and Joseph John William Watson, Wandsworth—Improved description of artificial fuel.

Sealed October 24th, 1854.

950. John Goucher, Worksop—Improvements in propelling ships and other vessels.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Oct. 21.	3648	Stamp and Label Box	Thomas Wharton and Sons	Birmingham.
24.	3649	Bit	Edward Conlan	Bloxwich.
26.	3600	Pencil Case	Burgess and Son	Birmingham.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 3, 1854.

EXAMINATION OF CLASSES IN INSTITUTES.

The Council desire to call the attention of the Institutions in Union to the following Memorandum respecting the proposal to examine and grant diplomas to students of the classes in Institutions in Union with the Society of Arts. It is particularly requested that Institutions and Associations in Union will, at as early a period as possible, communicate with the Secretary of the Society of Arts with reference to this subject.

MEMORANDUM.

At the Conference held on the 18th of May, 1852, it was unanimously resolved that the Society of Arts should offer to receive into Union the Literary and Scientific Institutions and Mechanics' Institutes established throughout the kingdom.

The objects of this Union, and the terms and conditions of joining it, are given in detail in the appendix (see No. 1).

One of the objects contemplated was, "That, without ceasing to be places of amusement, the Institutions should be assisted to become also places of systematic instruction, with systematic examinations, and certificates of the results of studies."

In the Spring of 1854 the Council of the Society of Arts prepared, and published in the Journal, the following minute:—

EXAMINATIONS OF INSTITUTE CLASSES.

"The subject of the Classes for Systematic Instruction in the Institutions in Union with this Society has long been under the consideration of the Council. In the replies given by the Institutions to the first circular addressed to them by the Council, in March, 1852, its attention was especially drawn to this very difficult subject; and it was discussed at the annual Conferences in 1852 and 1853. Much important information respecting this subject was given to the Society's late Committee on Industrial Instruction, whose report, with an appendix containing a large amount of valuable correspondence, was published last June.* It appears to be an unanimous opinion that every Institute should have its classes for adult instruction; but this desideratum is at present, in most cases, very difficult, and in many cases impossible, to be attained. Sufficient inducements have not, as yet, been generally given to the members of an Institute to pursue systematic studies in its classes; but it has been suggested that this defect might, in a great measure, be supplied, if stated examinations, by a Board of competent authority, were to present to those members the stimulus of emulation and competition, together with the honourable reward of a diploma or certificate, which might attest the merit of the examined; and that this Society might greatly benefit the Institutes by undertaking the requisite arrangements for the establishment of such examinations.

"The Council is not unwilling to undertake this duty, if the Institutes in Union deliberately desire it; but the best possible scheme of examinations cannot succeed if the Institutes are not now, and are not likely soon to be, in a position to present to the examiners a sufficient number of candidates properly prepared for examination. Assuming, however, that in due time such candidates will be forthcoming, the Council has considered what measures must be taken by the Society to insure success, if the Institutes should be able and willing to do their part in this business.

"In order that diplomas, or certificates, may be accepted as really valuable testimonials of persevering study and superior attainment, the examiners must be men of distinguished reputation, and their awards must not be lightly given.

"The Council has reason to believe that the Society can obtain the services of examiners whose names will command confidence.

"The details of the examinations cannot be settled until after the conference of the representatives of the Institutions, in June next. The following is a mere outline, intended to show how the plan would work, and to elicit the opinions of the Institutions. It is proposed:—

"1. That the examinations be held at least once a year (say in March), at convenient places in different districts, the Institutions in each district being grouped together for the purpose.

"2. That the examinations be conducted simultaneously by papers previously prepared by the examiners in London.

"3. That every candidate for examination shall have been for a certain period (say six months), a student of a class in an Institute in Union.

"4. That a local committee, possessing the confidence of the Institutions at each place of examination, receive the papers by post from the Board, see that the papers are fairly worked by the candidates, without copying from each other, and without books or other assistance; certify that all has been properly conducted, and return the worked papers by post to the Board of Examiners in London.

"5. That such worked papers as the examiners may approve of be divided by them into three classes, according to merit, 1st, 2nd, and 3rd; and that corresponding certificates be issued to the successful candidates.

"6. That each certificate state the name and age of the candidate; the total number of lessons given to the class; the number of lessons that he (or she) has attended; the subject, or subjects on which the candidate was examined; and the result of the examination.

"7. That no certificate be awarded for any paper which gave evidence of only a smattering of knowledge, however extensive, or which was not well spelt, and fairly and clearly written.

"8. That first class certificates be very cautiously awarded, so as to indicate a high standard of solid attainment.

"9. That a list of suitable subjects for examination be prepared for the approval of the 'Conference.' That candidates be examined at their option in any of those subjects; but that no candidate, after his first examination, take up more than two of the subjects in the same year, a thorough knowledge of one or two subjects being far more important than a superficial acquaintance with many.

"In putting forth this very important matter for consideration, the Council trusts that it will be borne in mind that success can only be obtained through the hearty co-operation of the Institutions. Such co-operation may be given by the Institutions in preparing and bringing forward fit candidates for examination, and by the influential friends of education, in stamping the proposed diplomas with a real commercial value, by acknowledging

* The Report of the Committee appointed by the Council of the Society of Arts to inquire into the subject of Industrial Instruction, with the evidence on which the report is founded. Longman and Co., 1853.

them as testimonials worthy of credit. It is hoped that few will look coldly upon an attempt to supply to the members of the Literary and Scientific Institutions, Mechanics' Institutes, and Athenæums, in Union with the Society of Arts, a portion, however small, of those advantages which are abundantly offered to the higher classes of the community in their competitive examinations, honours, and degrees.

"DECLARATION.

"We, the undersigned, having considered the circular letter of the Council of the Society for the Encouragement of Arts, Manufactures, and Commerce, dated March, 1854, and the plan therein set forth for examining and granting certificates to the students of the classes for adult instruction in the Literary and Scientific Institutions, Mechanics' Institutes, Athenæums, and other similar bodies in Union with the said Society, do hereby declare that we desire to promote the success of the said plan, and are prepared to regard as testimonials worthy of credit such CERTIFICATES as may be awarded in conformity thereto."

The foregoing minute was brought before the Conference in July, 1854, when it was unanimously resolved "That the Conference cordially approves, and requests the Council to carry out, their proposed system for examining and granting certificates to the students of classes of the Institutions in Union with the Society."

In June, 1854, Viscount Ebrington addressed to Mr. Harry Chester, at that time the Chairman of the Council, a letter, urging the importance of organizing a system of examination in rural districts, (extracts from this letter will be found in the appendix; see No. 2); and at the Conference in July, 1854, it was unanimously resolved, "That the Council be requested to prepare a plan for extending to the inhabitants of rural and other districts, where the establishment of Mechanics' Institutes is difficult or impossible, the benefit of connection with this Society, and of the Local Examinations proposed to be established by the Society in concert with the Local Institutions in Union with it."

The Council at once proceeded to give effect to this Resolution by extending to all such districts the special conditions on which it had already received into Union the "Hants and Wilts Educational Society for promoting Mental Improvement by means of Libraries, Reading Rooms, and Lectures." The Rules and Regulations of this Society are given in the appendix, in order to show the principles on which the Association is formed (see No. 3); and the following are the conditions on which it was, and on which similar Associations will be, taken into Union with the Society of Arts:—

"1. The usual annual payment of two guineas shall be made to the Society.

"2. All communications with the Society shall be made through the Secretary of the Association.

"3. No Institution of any kind, or under any title, fully constituted and established as a Mechanics' Institute, shall be admitted through the Association to the advantages of the Union with this society, unless such Institution shall separately subscribe its annual two guineas to the Society.

"4. The managers of village Libraries, village Reading Rooms, village Lectures, &c., in connection with the Association, not being fully constituted Institutions, may obtain the existing advantages of union with this Society in consideration of the payment of £2 2s. from the annual funds of the Association; but it must be understood that the Society relies on the officers of the Association for a careful discrimination of those bodies which ought, from those which ought not, to be expected to subscribe separately for the advantages of the Union with this Society, and reserves to itself the power of reconsidering the arrangements, if it should be found that bodies not contemplated herein are enabled to avail themselves of what is proposed.

"5. Pupils who may be pursuing systematic Studies in Evening Schools, or otherwise under the auspices of the Association where there are no Institutes, may be admitted to the examinations which may be established on the same footing as the Students of the Classes of the Institutes in Union with this Society."

The following is a list of proposed subjects for examination, but in every case they will be modified in such a manner as to meet the special wants of the district in which the candidates for examination may reside:—

1. Mathematical Sciences.
2. Experimental Sciences.
3. Sciences of observation.
4. Mechanical Sciences.
5. Social Sciences.
6. Fine Arts.
7. Moral and Metaphysical Sciences.
8. Literature.

Under the first head are included, 1st. Pure Mathematics, embracing Arithmetic, Algebra, Geometry, Conics, Trignometry, plane and spherical, with their applications to Geodesy, Navigation, and Nautical Astronomy. 2nd. Mixed Mathematics,—embracing Mechanics, Hydrostatics, Common Optics, Astronomy, with Land-surveying and Book-keeping.

Under the second, Chemistry, Electricity, Magnetism, Common and Physical Optics, Metallurgy, Photography, Laws of Heat, &c., and Mining, Manufacturing and Agricultural Processes dependent on the above.

Under the third, Practical Astronomy, Hydrostatics, Geography, Geology, Mineralogy, Crystallography, Zoology, Comparative Anatomy, Physiology, Botany, Agriculture, Management of Stock, Meteorology and Microscopical Observation, &c., and the Mining, Manufacturing and Agricultural Processes dependent on or connected with the above.

Under the fourth, Mechanism, Machinery, Engineering Constructions, Economy of Materials and Labour in Construction, Architectural Construction, including Buildings for dwellings, Manufacturing, Farming, and other purposes, Naval Architecture, &c.

Under the fifth, Economy of Trades, Manufactures, and Commerce, Political Economy, Domestic Economy, and Social Science, &c.

It is intended that the first examination shall take place in March next, and the Institutes and

Associations are requested to furnish the Secretary of the Society of Arts at as early a period as possible, with information how far and in what subjects they are likely to have candidates for examination in March, 1855.

The following gentlemen have already consented to act as Examiners:—Professor G. B. Airy, F.R.S., Mr. W. Sterndale Bennett, Rev. Dr. Booth, F.R.S., Mr. C. Brooke, F.R.S., Rev. R. W. Browne, M.A., Dr. W. B. Carpenter, F.R.S., Rev. S. Clarke, M.A., Professor C. K. Cockerell, R.A., Rev. Dr. Elder, Mr. J. Glaisher, F.R.S., The Dean of Hereford, Mr. J. Hullah, Professor Robert Hunt, F.R.S., Dr. H. Bence Jones, F.R.S., Rev. H. G. Liddell, M.A., Rev. Canon Mosely, F.R.S., Rev. J. P. Norris, Dr. Lyon Playfair, C.B., Rev. A. Bath Power, M.A., Mr. F. R. Sandford, Mr. J. Simon, F.R.S., Rev. F. C. Temple, Rev. Dr. C. J. Vaughan, Dr. T. Watson, Professor John Wilson, F.R.S.E.

APPENDIX, No. I.

Union of Institutions with the Society of Arts, London.

The principal objects of the Union, are:—

1. That the experience and information of each separate Institution should be rendered available to the whole body.

2. That there should be an Interchange of Privileges between the Members of different Institutions, so that the Member of any one Institution being temporarily in the neighbourhood of any other may enjoy at that other, for a limited period, the Privileges of admission to its Lectures, Library, Reading-Room, and Exhibitions.

3. That facilities should be afforded for the arrangement of combined courses of Lectures, and for effecting engagements with competent Lecturers.

4. That Books, Maps, Philosophical Instruments, &c., should be procured at reduced rates.

5. That facilities should be afforded, by interchange and otherwise, for the formation of Local Museums, Exhibitions, &c., &c.

6. That by the joint action of the Institutions in Union, the Laws which affect these bodies should be amended; that the Parliamentary Papers should be distributed among them; and that their *status* should be generally improved.

7. That, without ceasing to be places of amusement, the Institutions should be assisted to become also places of systematic instruction, with systematic examinations and certificates of the results of studies.

The object of the Council of the Society of Arts is,—not to govern the Institutes, nor to supersede their own efforts for improvement; but to stimulate, assist, and supplement their efforts, and to endeavour to enhance their success.

There are now 362 Institutions in Union with the Society of Arts.

Any Institution or Association desirous of entering into Union with the Society of Arts, must fill up, sign, and return to the Secretary, a printed form of declaration, accompanied with a copy of its rules. When this form has been approved by the Council, the Institution will at once be considered as "in Union." The required subscription of two guineas, for carrying on the general correspondence of the Union, may be paid in either of the two following ways: The president, or other analogous officer of the Institution, may be elected a member of the Society of Arts; or, the Institution may contribute from its own funds the payment of two guineas. In the former case, the gentleman so elected will enjoy all the privileges of a member, and will, at the same time, give to his own Institution, so long as he continues to hold office in it, the advantages of the Union. In the latter case, the Institution itself will receive the advantages of the Union, but no individual member of the Institution will enjoy the full privileges of a member of the Society of Arts.

[Here follows Form of Declaration.]

No. II.

[Here follow Extracts from Lord Ebrington's Letter in No. 84 of Journal.]

No. III.

Hants and Wilts Educational Society for Promoting Mental Improvement by means of Libraries, Reading Rooms, and Lectures, in Union with the Society of Arts, London.

RULES AND REGULATIONS.

1. The Association shall be called the HANTS AND WILTS EDUCATIONAL SOCIETY.

2. The objects of the Society are to promote the establishment of Libraries and Reading Rooms, and to encourage a spirit of inquiry and improvement, by the delivery of lectures on literary and scientific subjects, or by the formation of classes.

3. It being the object of the Society to promote and facilitate, but neither to arrange nor provide for the delivery of lectures, no member shall be considered in any way responsible for the lectures delivered in any Institution in Union; nor shall the name of the patron, president, vice-presidents, or of any officer of the Society, in any case be used, without his express consent, as the patron of any lectures, course of lectures, or Institution placing itself in Union.

4. The operations of the Society shall include the counties of Hants and Wilts, with such other places as by reason of contiguity or for convenience sake are accepted by the Committee.

5. Members consist—1st, of annual subscribers of £1; 2ndly, of donors, whose donations shall be considered as subscriptions at the rate of £1 annually, paid so many years in advance; and 3dly, of lecturers, whose services, having been accepted by the Committee, have given or undertaken to give at least three lectures gratuitously, in the current year, in Institutions in Union, without any compensation, on the mutual assistance principle.

6. Subscribers of 10s. annually shall be entitled to admission to all lectures on the footing of the most favoured member, and to the use of the diagrams and apparatus, in any Institution in Union.

7. Institutions in Union with the Society of Arts, and located in the two counties, shall be entitled to admission into union with the Society without any payment. Other Institutions shall be taken into union (subject to the approval of the Committee), on forwarding to the secretary of the Society an application to that effect, with the name of a member of the Institution who is, or is desirous of becoming, a member of the Society.

8. The management of the Society shall vest in an executive committee of at least five members, a secretary and treasurer chosen annually at a general meeting by the members; three shall be a quorum. The honorary officers, and the secretaries of the local districts under rule 14, shall be entitled to attend and vote at all meetings of the committee.

9. In furtherance of the objects of the Society the Committee shall have a power of making grants, as the funds may admit, in aid of the expenses incident on the establishment of reading-rooms or the formation of classes, provided always that in no case shall the grant exceed one-third of the sum locally raised.

10. A general meeting of the members shall be holden annually by the appointment of the Committee, for the transaction of business and the election of officers. The

meetings of the Committee shall be holden at such times and places as may from time to time be determined on by the members as being most convenient.

11. The Committee shall have the power of appointing the president, vice-presidents, and other honorary officers of the Society.

12. The depôt of diagrams, apparatus, models, &c., for the use of lecturers shall be formed, and placed under the charge of a curator; *they shall be issued only on the request of a member, and for use only in the member's own house, or in an Institution in Union;* the expenses of transit from the nearest railway station shall be borne by the member applying for the articles, who shall also be responsible for their safe return.

13. The Society shall endeavour to promote lectures in the rural and smaller Institutions on the principle of mutual assistance, and in the larger Institutions by a list of lectures offered gratuitously to their choice; provided always that nothing in this rule shall be understood to prevent the larger Institutions from joining with others on the mutual assistance principle, or the smaller from drawing from the gratuitous list. For either purpose communications and arrangements should be made with the local secretary.

14. For the purposes of the Society the division of the country into Unions shall be adopted, and eligible persons appointed to act for one or more Unions as local secretaries, to promote the establishment of reading rooms, and to arrange the Institutions into circles for the delivery of lectures.

15. Half the subscriptions of members subscribing also to an Institution may, at the option of the members declared at the time of subscribing, be applied to the local expenses of the Institution.

16. In the case of paid lecturers their expenses shall be borne in equal proportions by the Institutions, but each shall defray separately the travelling and other personal expenses of the lecturer according to the circumstances.

17. In towns where more than one Institution is in union, the lectures shall be open on the same terms to all, each bearing its share in the expenses according to the number of members on its books.

18. The expenses of lectures shall be paid to the Local Secretary, or to the Treasurer of the Society, and in no case whatever to the Lecturer.

19. Every Institution joining the Society shall be at perfect liberty to carry out its own rules on its own conditions, subject only to those of the Society, which shall in no way interfere with the management of the Institution.

BYE LAWS.

Diagrams and Apparatus.

1. No member shall detain the Diagrams or Apparatus more than a fortnight from the day of issue, under a penalty of 2s. 6d. forfeit for every day over time.

2. All expenses, beyond the transit of the Diagrams, &c. by railway, shall be borne by the borrower, and charged to him if not paid when the Diagrams are returned to the Curator.

3. No Diagrams, &c. shall be issued without the written or personal application of a member, who shall be answerable for all injury sustained by the Diagrams, and the expense incurred in their reparation shall be charged against him.

4. Members applying to the Curator for Diagrams, &c. *must mention also the Institutions* in which they are to be used, and the conveyance by which they are to be sent.

Book Lists.

1. A List of books required by any Institution or Reading Room in union must be sent in to the Secretary o the Educational Society, before the 15th days of June September, December, and March, by whom they will be ordered through the Society of Arts at a reduced price, and transmitted to the orderers.

2. The Secretary who sends in the List is desired to say in what way the books are to be forwarded. The carriage to Winchester will be paid by the Society; from Winchester by each Institute.

Examinations and Certificates.

1. Members of Institutions or Reading Rooms in union will be admitted to the examinations for certificates on the same terms as Members of Institutions in direct union with the Society of Arts, provided they comply with the conditions of the Society, and present to the Examiners, at the nearest place of examination, the necessary certificate, drawn up and signed by the secretary of the Educational Society.

2. In the case of members of Reading Rooms or Institutions located in villages, attendance at an evening school, and lectures in connection with the Reading Rooms will be accepted in lieu of classes.

MEETING OF COUNCIL.

Monday, 30th October, 1854.

The following Institutions have been taken into Union:—

374. Blackburn, Literary Scientific and Mechanics' Institution.

375. Wells, Literary and Scientific Institution.

LIST OF LECTURERS.

The Secretary exceedingly regrets that an error has occurred in the insertion of Mrs. Butler's name, whose address is Oakley-square, Regent's-park, as recommended by Highgate, in place of Mrs. Fanny Kemble, whose address is to the care of John Mitchell, Esq., 33, Old Bond street, London.

ON THE APPLICATION AND RECOIL OF ARTILLERY IN STEAM-VESSELS.

By W. Bridges Adams.

What is Recoil in Artillery?

The simplest definition is—the imperfect resistance of the projector to the elastic vapour used to propel the projectile: in other words, the weight of the projector should exceed so much that of the projectile as to remain inert, in which case the whole force of the powder, rightly used, would be expended on the projectile, and there would be no recoil. If the proector be not inert by reason of its own mass, it may be aided by being firmly attached to some other mass, as a ship's side, or a weighty carriage or stock, as of a gun. The advisability of this must be regulated by the strength of the ship's side, or the carriage or stock. If the shock of the gun be sufficient to start the timbers, or draw the ring bolts, it is clear that the gun and vessel are not proportioned to each other, and in such case the recoil should be expended, if practicable, in forcing the gun up an inclined plane, or, if held by breechings, those breechings should be elastic, to prevent the sudden check of momentum from producing breakage. It is possible that the fastening to timber sides may in itself afford some elastic yielding, and also the twist in the rope breechings. Experiments in attaching a heavy gun firmly to granite blocks would probably give a different result from the attachment to "fir posts fixed in the ground." The fir posts might themselves be elastic; and to exhaust the experiment, the same fir posts should have been tried with guns of various sizes.

With regard to the recoil or non-recoil of vessels in water, under the discharge of guns firmly attached, it is merely a question of proportion and construction of the vessel, as well as ballasting. Some vessels roll more than others, by reason of their form. A given lateral pressure on the sails of a vessel will place the deck at a given

angle with the horizon, by means of the leverage of the masts, and it is clear that the force of a sufficiently heavy broadside recoil would do the same thing, though a single gun might not. The guns on the upper deck would produce the greatest effect, and still greater if placed on the yards and tops. But supposing them all to be fired at the water level, it is quite clear that the recoiling force, if not absorbed by some elastic medium in the vessel, must be transmitted to the water, and that the vibration would thus be much less mischievously expended than if the vessel were embedded in a granite dock.

An obvious experimental mode of ascertaining this would be the discharge of several broadsides afloat, and other discharges, after fixing the vessel at the proper height in a dry dock. Regulating pendulums would ascertain the result. In the experiment of the long gun attached to fir posts, there is no doubt that—other things being equal—the length of the gun would add to the inertia and diminish the recoil. But there is yet more in the length of the gun.

If a carronade were charged with a similar weight of powder and shot to a long gun, the latter would carry furthest, and with the least recoil, and the advantages of the long gun would be in proportion to the smoothness and accuracy of the bases. The reason is obvious; a cannon must be regarded as a steam-engine cylinder, generating steam without a boiler. The larger the cylinder the more expansively the steam may be used. In a long gun the pressure of the steam or gaseous vapour follows the projectile and adds to its force. In the short gun great part of the elastic force expands laterally at the muzzle without effect on the projectile. To compensate for this the practice has obtained of increasing the charge of powder, and this again tends to increase recoil, and damage the gun, which is in a constant process of disintegration, not being capable of projecting more than a comparatively small number of shot before it is destroyed, whereas, were the projectors perfect, there is no reason why a well-constructed gun should not project as many shot as a rifle.

The Eastern nations have a practice of using very long cannon, with small bores; they also use long guns, like American riflemen. It is not science, in our sense of the word, that has brought them to this conclusion. It is simple knowledge—trial, and error. They would not have constructed guns difficult to manipulate and move, but for some ascertained advantage. The mere act of charging a very long cannon involves great trouble, and their cannon are not breech-loading, though the rough ingals, intended for camels backs, are.

The proportions of American rifles, as regarding bore and length, vary from one in 72 to one in 108, and the thickness of the barrel approaches to the diameter of the bore at the angle of the octagonal ribs. Now there can be no doubt that an American hunter, who has to "tote" his own gun for months over weary miles of forest and prairie, fancies he has, and most probably has, some good reason for using so heavy a weapon. If, therefore, these proportions be the right ones for a ball weighing one quarter of an ounce, they should be mechanically right for a ball weighing one hundredweight. The ball should fit a smooth-polished bore accurately, as the piston of a steam-engine, and the length of the bore should be such at to give the amount of frictional retardation without windage, that would gather up the whole elastic force generated. The idea of a tube three feet in diameter, with a twelve-inch bore, and seventy-two feet in length, would be a startling one; and so would an eighteen-inch tube, with six-inch bore, and thirty-six feet in length; but, as the Americans say, "there are no two ways about it." If the proportions be right in the rifle for obtaining the maximum range with the most accurate flight, the proportions of the cannon should be the same; or, if very heavy projectiles be absolutely necessary with comparatively short guns, and the quantity of powder be increased to make up for want of length, the accuracy of flight must be lessened by the want of inertia. The range of a Minié rifle is said to be 900 yards, the range of the largest-sized cannon does not exceed 5,000; so that the additional powder consumed is very greatly in excess of the additional range obtained.

To charge an American rifle with a hickory rod is not difficult, but to manipulate a proportionally heavy cannon with a pine-tree spar would be a troublesome problem to solve; and this brings us to breech-loading, a process that has only not been accomplished because it has not been sought for in the right mode. The advantages of breech-loading are so great, in mechanical construction and facility of charging, and in the shelter of those working the gun, and other things, that serious experiments to overcome the apparent difficulties cannot be much longer delayed.

Now as to the question of application to steam vessels. If the breech-loading gun be attached to the ship's side, upon the principle of non-recoil, a much longer gun can be used than on the principle of running it in and out of the port. In such case, the proper mode of attachment is, not by fixing it on a carriage bolted to the deck, but by placing a large flange on the gun at or near the muzzle, so formed that it will serve as a ball for a socket joint, the socket to be formed in the ship's side. A gun so fixed would require no framing or carriage. It would merely require a single wheel at the breech end, turning on a horizontal circle struck from the ball centre, with an elevating screw. Thus the port would be perfectly stopped against shot entering and also against the smoke of the gun entering,—a great advantage between decks. The question of aim remains. This could be accomplished by perforating the ball flange with an orifice of sufficient size in a line with the breech sight, and, if need be, fixing a telescope to it. The height of the gun should be such that an average man could look along the sights without stooping. Beyond this the steam vessel affords another advantage. The mischievous heating of the gun might be totally prevented by applying a hose to the open breech connected with the pumps of the engine, and washing out and cooling the gun after a certain number of discharges. The hose could be suspended to the deck beams above. It would be possible, with such an arrangement, supposing the vessels were shot-proof, to carry on an action without a single man being hurt at a gun, and with half the amount of hands. The ball flange should accurately fit the sockets, and be effectually lubricated to induce easy motion. A vessel thus prepared might defy the Minié or any other rifle in approaching an adverse vessel or coast. The absence of gun carriages would induce less splinters, and the ship's sides between the guns might be packed with sand-bags.

In case of the pivot gun on deck commonly called a "Long Tom," breech-loading would permit of the application of a boiler-plate bulwark, or shield, moving with the gun, and capable of resisting small shot, and deflecting large ones, while sheltering the men engaged in working the gun, answering the purpose better than the ancient pavisse which archers formerly carried with them to plant in the ground while they discharged their arrows.

Working guns in the mode thus described, no steam power is requisite; but there is a valuable application of steam power to gunnery that has been hitherto wholly neglected. It is many years since Perkins produced his steam-gun, for the purpose of throwing a shower of shot. It failed because he too rapidly burned out his generators or retorts, in which he converted water into gases, rather than steam. But, if the steam-engine were employed to condense air into proper reservoirs, the air could be used as a propeller to throw a shower of shot from under cover, to sweep into an enemy's port-holes, or over his decks or rigging, or through the embrasures of fortifications in harbours.

I have but glanced at a few of the principles involved in this very momentous question of our naval gunnery. There are many others which time will not now permit

the discussion of. At present a piece of artillery is just what it was at its discovery—a cylindrical tube with a small vent, on which the minimum of art has been bestowed, and which is very rapidly worn out and destroyed in war. We yet need a series of well-digested experiments—first, as to the most perfect form of gun, and next as to its various applications to damage the foemen while sheltering the gunners. It is not to our credit, as a civilised nation at the head of the world's mechanism, that the guns of a mere military empire should throw their metal as far and as accurately as ours—less the skill of the gunners, the more especially if it be true that these guns have been furnished from English foundries, and are not producible in Russia. It is possible so to construct a vessel that no enemy's shot could tell upon it, while every shot of the vessel might tell on the granite batteries of Cronstadt, and with our means and appliances we ought to destroy them without the loss of English or French life. Our race of skilful engineers ought to be provided with better battering tools than the lumps of cast iron, whose improvement has been chiefly a gradually increasing size, by the better manipulation of the material.

WORKING MAN'S COLLEGE.

Professor Maurice's Inaugural Lecture.

On Monday evening Professor Maurice delivered his inaugural lecture in St. Martin's Hall on the opening of the Working Men's College, Red Lion-square. The professor commenced by tracing the origin of the use of the word inaugural, from the practice of the Romans to consult the augurs on the commencement of any great undertaking. The projectors of the Working Men's College had also consulted their augurs, but had found them to differ in their divinations. One said that the working men were athirst for reformation; another, that all they thought about was their wages. He believed both, as it was quite possible that the two apparently different feelings might exist in the same man. He could recognise somewhat of this difference of feeling in himself. But which augur should they follow? Both. Assume, that working men had a depressing influence working within them, but believe that at the same time they were most anxious to throw it off. So had our parents acted with us,—resisted the depressing influence and stimulated and cultivated our better nature. "Go thou and do likewise." There was nothing true about the working class that was not equally true of every other class in the country, and all offered the same field for improvement. It was said that working men did not care for colleges, but he feared that there were indications of an increasing indifference in the upper classes to the true ends of collegiate education. Our existing colleges had done great good in so far as they taught how much more valuable it was for men to feel they were men, than to value the distinctions of one man above another; but he feared he saw symptoms of disease in the coarse habits creeping into our great universities, and therefore he was anxious to bring back colleges to their old use, that of developing the best qualities of men, without regard to the accidental distinction of classes. Some of the augurs deprecated this object, as likely to receive no encouragement from the working men, who were, they said, absorbed in the struggle for existence. It was said they might be induced to learn arithmetic, and perhaps mathematics, but how induce them to take to history and the fine arts? His belief was that Englishmen could never be induced to pursue knowledge merely for its own sake, nor did he wish it. He could admire the German's patient research, but would not attempt to imitate it. With us the political object was the basis upon which all other studies must be cultivated. If we endeavoured to banish business and politics from the English mind, the result would be most painful, but the College would make no such attempt. The object in bringing the working man into a college was not to shut him out from politics, but to endeavour to enlighten him on those national and practical subjects in which he took so deep an interest already. He feared that this peculiar bent of the English workman's mind had been hitherto overlooked in all the attempts that had been made for his intellectual advancement. Benevolent persons had talked of throwing open to the working classes the colleges of Oxford and Cambridge. But supposing it were so arranged, what would be the result? A few scholars would be abstracted from the whole mass, but the great majority would remain as before. Supposing, on the other hand, they endeavoured to educate the working man by desultory evening lectures, would it be possible to bridge over the chasm between his daily occupation and his nightly study? He (Mr. Maurice) felt that it would not, and the object of the Institution which they were then inaugurating was, if possible, to make the two periods act harmoniously. The working man had a valuable education already in his occupation, in his home, in his family, and in his poverty, of which the training of the Institution would be the complement. A few years since the projectors felt that the working men were suffering much from strifes amongst themselves. They found that while the aggregate wealth of the country had increased by the skilful division of labour, and the working of all the divisions harmoniously together, the workmen themselves went entirely on the opposite principle—namely, that the whole end and object of their being was that they should destroy each other. The projectors had endeavoured to remedy that state of things, but they had been misunderstood. They had instituted lectures, but they found that they did not reach the working men. At last the working men of Sheffield found out the thing wanted, and the proper name for it. They had instituted establishments for mental and moral cultivation, and had called them colleges, which signified educational communities. The meeting would therefore understand why the projectors of the Institution in Red Lion-square had called it a college. They had done so deliberately and advisedly, anticipating some ridicule, but determined to face it. They meant not to seek patronage or pupils, but to organise a society in which working men might on equal terms cultivate their intellect. He wished working men not to think that in attending this Institution they were merely learning in a leisure hour, but to consider that they were members of a college as much in their workshops as when in the Institution. He felt certain that when the beginning was made—the sign given—the example would be followed all over the country. This was the first object—the second was how best to economise the spare time of the working man. With that view they had substituted in their system lessons for lectures, the half of each of which would consist of questions on the subject of the previous one. Thirdly they proposed to give the student a considerable choice of subject, while no one would be restricted as to his choice. The system proper for boys they felt was not the best for the improvement of men. They had at first commenced on too refined a scheme, but had soon been compelled to abandon it. The programme would tell them the course of study now adopted, and he would proceed to point out its probable mode of working. Sunday would be devoted to the Bible, but attendance upon that lecture would not be considered an indispensable condition of attendance on the other evenings. He would never have consented to such an arrangement, which in his opinion would have degraded a great subject. His practice would be to invite questions, and the book itself would solve all difficulties. Monday would be devoted to health, and he trusted that the recent visitation would impress upon the students the importance of that long-neglected subject. They must study God's laws, which regulated health and disease, and man's laws as they bore on the preservation of the one and the prevention of the other. The professors of this division were, Mr. Welsh, a medical man of great eminence, and Mr. Hughes, a barrister, who had devoted much time in collecting the statistics of cholera. Geometry would be taught by Mr. Hose, late of the

Westminster School, who would show its application to the common business of life. Mr. Furnival would take English grammar, and his object would be to enable the pupil to express his thoughts in plain intelligible English, as every Englishman should do. The lawyers would be obliged to tell them some of the mysteries of their craft as they affected the law of partnership and other important subjects. The prospectus mentioned two subjects which would have great prominence in their teaching—politics and language. They were both pre-eminently human studies, and human studies were the business of a college. On Tuesdays he (Mr. Maurice) would give instruction on political terms, and would illustrate them by examples. Mr. Locock would instruct them in astronomy, the centre of the applied sciences; and Mr. M'Lennan would teach them the uses and principles of machinery. For drawing, one of the most distinguished of modern artists had offered them his assistance. Mr. Ruskin, in undertaking this department, would at first attempt to give the pupil steadiness of hand; and if the latter gave indication of higher perceptions, then to develop them to the utmost. Mr. Westlake, of Trinity College, Cambridge, would treat of arithmetic and algebra, which would be most valuable when taught by a scientific man. He would also give lectures on the geography of Turkey and Russia as connected with the present war, and Mr. Brewer would devote himself to the geography of England as connected with its history. He (Mr. Maurice) proposed to give a lecture on the reign of King John, as connected with Shakspeare's play. Whose writing so fit for the study of working men as those of England's working poet, who had best described our kings, because he best understood our people? Saturday was left a blank, because he believed that music, to which it was devoted, would be better cultivated where they stood than in Red Lion-square. Mr. Hullah had released the workmen from the stigma of having vocal powers only for shouting at the hustings, and if he had not found other capabilities he had made them, and therefore he was the best fitted to continue their musical education. He trusted then that they would begin their work under favourable auguries, and one he would mention was, that although they had not solicited subscriptions from the public, some kind friends had sent them contributions. Amongst the earliest of the contributors was one of the name and kindred of the late Dr. Arnold, and the next was one who had already done much for the working men in his factory at Vauxhall. They had an augury of what firm purpose and resolute will could effect on the heights of Alma, and the application of such firmness of purpose and such resolute will to the business of civil life was all they required to secure success in their present undertaking.

INDIAN RUBBER.—ITS USES IN THE ARTS.

(*From the Art Journal.*)

Dr. Priestly, in one of his letters to a friend, remarks that he had just seen a very curious specimen of a vegetable gum, of which a very small quantity had been imported, possessing the remarkable property of removing pencil marks from paper. This is, comparatively, a short time since: we find, however, that the characters, physical and chemical, of this vegetable exudation have gradually been discovered, and its useful applications have rapidly followed the investigations of the experimentalist. These applications are now exceedingly numerous, and they promise to become yet more so; extending from the vulgarly useful overshoe, to the more elegant piece of cabinet-work, and the efforts of art as shown in elaborate and beautiful carvings. To some of these we purpose to direct attention, an examination of some of the more recent applications of caoutchouc having convinced us that much is yet to be done with this, in every way, interesting substance.

In the vegetable world there are a great variety of plants which yield, when an incision is made through the bark, a milky juice; and this, too, on drying, forms an elastic substance resembling, in many respects, the true Indian-rubber. The lettuce, the spurge, the thistle, and several common plants are familiar examples. The true Indian-rubber—caoutchouc, or gum elastic—is, however, the product of certain tropical plants. It is obtained more especially from the *Siphonia*, a plant growing abundantly in Java, and in some parts of South America. The juices of numerous trees growing over the entire range of the Eastern Archipelago, and the Asiatic peninsulas of Malay and Siam, are, however, collected and mixed with the true caoutchouc, or sent into the market as varieties of Indian-rubber. The variations in quality of these inspissated juices are curious: some of them possessing abundant elasticity, a property which is entirely absent in others.

The Indian-rubber tree (the *Ficus elastica*) of Assam is an exceedingly beautiful tree, and most abundant. Forests of it spread over this beautiful country, and the collection of the juice furnishes abundant employment to a great number of the natives. Incisions are made through the bark of the trees at certain periods of the year, and the milky juice flows out abundantly. This is collected in various ways. It is sometimes allowed to flow into clay moulds, and then dried by slow evaporation in the sun; this forms the thick lumps of *white* Indian-rubber which we occasionally obtain. Another method is to form clay into some shape, such as bottles, shoes, &c., and covering these with a layer of the liquid caoutchouc, dry it in a smoky fire; upon this another layer is then spread, and so on until the required thickness is obtained: the clay mould is then broken to pieces and removed, leaving the Indian-rubber in the required figure. In this way the bottles, shoes, and grotesque figures of animals which we see in *black* Indian-rubber are formed, the blackness being entirely dependent upon the carbonaceous matter which combines with the juice in drying.

The milky juice dissolves in any quantity in water, or perhaps it would be more strictly correct to say it was miscible in any proportion. When once hardened, however, it cannot be again restored to the emulsive state, the cohesion between the particles becoming too strong for the separative power of an aqueous fluid. It is, however, soluble with heat in spirits of turpentine, in the cold in some of the essential oils, and especially in coal-tar naphtha.

Indian-rubber melts at a temperature of 248° Fahr., after which it hardens very slowly by exposure to the atmosphere; the solidification being due to the absorption of oxygen from the atmosphere.

Within a few years Indian-rubber has become of the utmost importance in the arts and manufactures. Elastic materials are now made extensively from this substance: this is effected in the most satisfactory manner as follows. Caoutchouc bottles are fixed upon an ingenious machine and made to revolve regularly against a sharp knife, water flowing over both the Indian-rubber and the knife at the same time. Long spiral threads are thus obtained: these lengths of Indian-rubber are covered with thread, and then woven into the required articles. In this process the caoutchouc loses much of its elasticity and becomes permanently elongated, unless means are adopted to recover its elastic character. The means, fortunately, are very simple; by the operation of a moderate heat the Indian-rubber contracts, resumes its former molecular state, and its elasticity.

If a piece of Indian-rubber is kept for some time stretched to the utmost length which it can bear without breaking, it loses its elastic character, acquiring what engineers call a "permanent set." This can, however, be overcome by heat; when held near a fire the long strip of non elastic Indian-rubber will gradually contract to its original dimensions, and become elastic as before.

The physical phenomena connected with the expansion and contraction of Indian-rubber are interesting and in-

structive; indeed it has been used for the purpose of illustrating the production of heat by muscular action. If a strip of Indian-rubber, or an Indian-rubber band be taken into the hands and drawn out strongly, it will be found, upon placing it thus expanded against the lips, that a considerable quantity of heat has been developed. If we now relax the strain, and allow the band or strip to return to its original state, the sensation, if it be applied to the lips, is that of coldness. If we apply it to the bulb of a thermometer the mercury will either rise or fall, according as Indian-rubber is in a state of tension or the contrary.

A most important use of Indian-rubber is the preparation of waterproof fabrics. These are, in some cases, made of the elastic threads, but more commonly they consist of some ordinary textile material upon which has been spread a layer of Indian-rubber in solution. In the best kinds, two sheets of cloth are placed together, with a layer of dissolved caoutchouc spread between them. The ordinary solvent employed for this purpose is the naphtha obtained from the distillation of coal-gas, which is, perhaps, the best solvent for Indian-rubber with which we are at present acquainted.

Mr. Charles Keene has applied this material to a great variety of purposes for both use and ornament. By him caoutchouc was applied to leather for the purpose of improving and ornamenting its surface. A varnish is first made by dissolving the Indian-rubber in spirits of turpentine, and then incorporating it with lamp-black until it is the consistence of dough. The edges of either doeskin, buckskin, or wash-leather, being introduced between a pair of wetted rollers, as much of the Indian-rubber compound as may be required, softened by a gentle heat, and rolled into the proper length, is laid in the hollow between the leather and the cylinders. These being set in rotation, a complete coating is effected, and the Indian-rubber and the leather most closely united. This surface may be embossed, gilt, and ornamented in various ways.

The sulphurisation or vulcanisation of Indian-rubber is one of the most curious, at the same time that it is one of the most valuable of discoveries connected with this manufacture.

There does not appear to be any clear understanding of what really takes place. We have been informed by the late Mr. Brockedon, who devoted considerable attention to the manufacture of Indian-rubber, that, when exposed to the fumes of sulphur, a portion was absorbed which entirely altered the character of the elastic gum. There have been several patents, embracing the combination of Indian-rubber and sulphur. As far as we can learn, the sulphuration of Indian-rubber was due to Mr. Charles Goodyear, of New York. Mr. C. Nickel's patent consisted in kneading together ten pounds of sulphur and sixty pounds of caoutchouc. Another patentee employs crude antimony and the sulphuret converted into Kerme's mineral. This was mixed with the caoutchouc and subjected to heat, the temperature of 250° to 280° Fahr. being required to effect the combination.

The remarkable elasticity of vulcanised Indian-rubber renders this substance most extensively available. Some remarkable changes appear to take place in some varieties of this sulphurated caoutchouc after the processes of manufacture have been for some time completed. Vulcanised bands, whether they have been extended or kept loosely in drawers, gradually become brittle, and break with the slightest touch. They then exhibit upon examination a granular structure, very different from the smooth and bright fracture which Indian-rubber shows when broken by the force of tension. It is not all varieties of the vulcanised material which are liable to this; it would therefore appear to be due to some imperfection in the manipulatory details. Phosphorus and hydrogen have been combined with Indian-rubber; although they produce a condition somewhat similar to that due to sulphur, they are inferior to it, and these chemical elements have not been practically applied to the purposes under consideration.

Sulphur has been used to give great elasticity to caoutchouc. By a modified form of its application the elasticity is entirely destroyed, and the Indian-rubber becomes as hard as wood, possesses exceeding tenacity, and is at the same time easily worked into articles of use or ornament. Goodyear's prepared Indian-rubber has been for some time manufactured in France, and most extensively employed; although it is only recently that any attempt has been made to introduce it into this country. The prepared Indian-rubber puts on so many new features, and appears to be in many respects so important, that a particular description of its manufacture appears to be required. In all the processes by which caoutchouc has been prepared, there was a great difficulty in working up the inferior qualities, but in this process the commonest kinds may be employed.

The impure and very coarse descriptions of *Java gum*, and the coarser qualities of *ordinary gum*—by these terms Indian-rubber is known in the market—are taken. The masses as imported are cut up into pieces about the size of a hazel-nut, and are macerated for some time in a caustic alkaline solution, in order to disintegrate the ligneous matter and other impurities contained therein. It is then worked with water to remove the alkali, and dried on wicker-work frames.

Indian-rubber thus prepared is passed through heated rollers, and sulphur is mixed with the plastic mass until thoroughly incorporated. The sulphurated Indian-rubber is then allowed to run off the rollers in long sheets, about half an inch in thickness, after which it is cut up into convenient sizes. These small sheets are placed upon metal plates, and arranged in an empty steam-boiler, or some similar chamber, in which it can be exposed to the action of high-pressure steam. All being thus properly arranged, high-pressure steam of the temperature of about 300° centrigade is forced into the boiler or chamber. The vulcanised caoutchouc is subjected to the action of this hot steam for a few hours, during which a peculiar change is effected.

The sheets which were so perfectly elastic, and so soft as to admit of kneading, are now found to be hard, sonorous, and brittle, though difficult to break. It is much like horn; and, when considerable force is applied, it breaks off with a clean and bright fracture.

This prepared Indian-rubber is worked with similar apparatus and implements to those used by horn-cutters, comb-makers, and others. By the application of heat this substance can be bent into any required form, pressure being applied at the same time. The polish of which this substance is susceptible renders it equal to ebony for many ornamental purposes. The range of its applications may be inferred from a notice of some of the articles now manufactured from it. Combs ot every description are now made and extensively sold. These are described by all who have tried them as being most pleasant to wear or use. Artificial whalebone, used for stays, umbrellas, and walking-canes. Instead of horn it is used extensively, especially in a manufactory at Lisle, for sword and knife handles. Cabinet-work of many kinds are made from this material—desks, tables, chairs, &c. Indeed, its utility and its many peculiar excellencies, appear to render it available for many purposes to which it has not yet been applied.

The very worst qualities of Indian-rubber may be worked advantageously. It can be obtained in unlimited quantities, and possessing many of the excellencies of ivory, ebony, and whalebone, we cannot but think that in a few years the manufacture will became one of the first importance.

This prepared Indian-rubber carves admirably; it, therefore, from its strength, is peculiarly suited for delicate works. In situations where it would be dangerous to expose ornamental woodwork this material may be freely used; and for many purposes to which wood is inapplicable it appears to be singularly well adapted.

In the progress of our applications there are not many

at once more curious than this. A milky juice, the product of a peculiar class of tropical plants, by the art of man becomes converted into a solid substance, possessing many of the properties of ivory and horn, which can be employed for many purposes of great utility, and adapted to numerous ornamental ends.

Home Correspondence.

NEW ZEALAND FLAX.

Old Ford, August 12th, 1854.

SIR,—In returning to you the sample of the New Zealand Flax cleansed by my method, I have enclosed a report of the same by one of the most experienced brokers in London, G. Noble, Esq., George-yard, Lombard-street. It will be seen that with my machine a double operation is performed, that is, cleansing and hackling at the same time, thus effecting a saving of at least five pounds per ton for hackling. For the increased value of the article, I refer you to Mr. Noble's report. The cost of the machine would be about £70. It works by power. Two horse-power would be ample to thoroughly cleanse and hackle from two to three tons per week, requiring the attendance of six boys or girls of about the age of 12 to 14 years, and, supposing wages double in New Zealand to what they are here, allowing two shillings per day for each hand, it would cost about three pounds per ton, exclusive of power. From the abundance of water in New Zealand that would be very trifling; one man could overlook several machines. I have also a hand-machine, which could be made at the cost of about six or seven pounds, so that a man, with the attendance of one boy, could clean and hackle from 70 to 80 pounds per day, but it would be very fatiguing work, something like grinding beans, or malt. I think no man, where labour is scarce, would ever submit to that sort of employment; it would be quite folly to do so where water power is so very abundant.

Having studied the subject for many years, and having had my name honourably mentioned at the Great Exhibition of 1851, and having been a practical manufacturer of ropes, lines, &c., of every description, both by the old method of hand spinning and by the present spinning machine, for nearly thirty years, you will allow me to say a few words on the subject, although I fear I may not quite agree with some of the talented writers on this subject who have preceded me. In the first place I must beg to observe, I think many persons who have received portions of the New Zealand flax sent over by the New Zealand Society, are apt to imagine that it is sent over in the state it is grown, without any preparation, and from the tenor of the latter part of the very interesting report by Mr. Charley, of Belfast, in No. 83 of the Society's Journal, I should conclude he had the same impression, for he states, in page 543, "I should recommend the New Zealand Society to purchase and import from this country one of Wilson's patent scutching machines, which will be a great improvement on the old system of scraping off the refuse matter from the fibre with the sharp shell, as the natives hitherto have been accustomed to do." If Mr. Charley recommends the above machine to supersede the native labour altogether, this, or any other machine hitherto invented, will be found perfectly useless. If Mr. Charley supposes that the New Zealand flax which he has been experimenting on, is in its natural state, as cut from the plant, he is not at all singular in his supposition. For some months I have been travelling in the three kingdoms for information on flax scutching, and have seen both Wilson's and M'Bride's machines in operation at their respective manufactories in Scotland and Ireland, and have given orders for both machines for English flax scutching, and most persons I have met with who have been experimenting on the New Zealand flax, have thought its being such a rough article, that it was not possible anything could have been done to it. The Messrs. M'Adam, the engineers of Belfast, and Mr. M'Bride, were not at all aware that the flax sent over by the New Zealand Society was first prepared by the natives.

From what I have seen of Wilson's and M'Brides scutching machines, however well they may do for scutching home-grown flax, I do not consider them at all adapted for cleaning the New Zealand flax.

I think M'Bride's machine for scutching, the most clever invention ever produced, and he richly deserves the thanks of the nation for the great efforts he has made to bring to perfection such a desirable machine. I do not wish my opinion to be taken respecting the different methods of cleaning New Zealand flax; but, when each person's specimens are delivered, I would recommend that the opinion of any respectable hemp and flax broker be taken as to the market value of each, with the cost of production, &c. I was particularly unfortunate in the specimen of New Zealand flax sent me to operate on, as the greater portion of it was sea-damaged.

My first acquaintance with New Zealand was about the year 1827 or 1828; I have been making experiments with the native flax from that time to the present with chemicals of various kinds, such as are used in bleaching, &c. I once placed two lots in a high pressure boiler for seventy hours, at a pressure of sixty pounds to the inch, one portion in the water, the other out, without having the least effect on it, or at all getting rid of the gum, but it was much decreased in strength.

I think there have been more thousands of pounds fruitlessly expended in endeavouring to develop the capabilities of the New Zealand flax, than any other fibre. A company was formed in London some years since to carry out an invention for the preparation of the New Zealand flax for general purposes. I was requested to examine into the affair by a gentleman who was invited to become a director, and was much astonished at the beautiful specimens produced in articles of every description of manufacture that were made from European flax. The result of my observations was they were attempting too much. It is one thing to manufacture as a curiosity, and another for profit. I advised my friend to have nothing to do with it; the concern was carried on for some time, and ultimately closed with the loss of many thousands.

About five or six years ago a merchant of Wellington (New Zealand) sent me two bales of flax, prepared from the whole leaf, by a company at that place, to have my opinion on it, stating any quantity could be produced at £25 per ton; to my great astonishment it had not the least appearance to that prepared by the natives; it was more like finely-split cane than anything else; not the slightest spinning quality in it, and very bad colour; some more shortly after arrived, with some native dressed; they were both put up to public auction. That prepared from the whole leaf by the new process realised £16 per ton, the native prepared £34 per ton.

The Europeans appear to have lost sight of one fact, which the untutored native had discovered years before, that is, the really valuable part of the leaf, containing the fine fibre, is the bright side of the leaf only, forming a skin as it were to the leaf. The natives make an incision about the middle of the leaf with a mussel shell, and pealing it off, the remaining portion is thrown away as useless for flax. That sent over by the New Zealand Society is prepared by the natives in the same way. The flax is subjected to a further scraping when they work it up for themselves; hence the great difficulty in inventing any machine to wholly supersede their labour. If the remaining part of the leaf contained no fibre, there would not be the least difficulty in inventing a machine for cleansing the whole leaf; but the part thrown away containing a large portion of a woody sort of fibre, in converting the whole leaf into fibre the two qualities are mixed, producing a comparatively useless article.

It is stated in the communication from the New Zealand society, "that a process of boiling the leaf in clear water is sufficient, but a new difficulty remains. After

boiling, the leaf requires washing, as a laundress does linen, by rubbing with the hands, which frees it altogether from the gum, but so increases the expense as to preclude the flax becoming an article of commerce." If the above was the only difficulty to contend with, I think nothing would be more easy then to invent a washing machine that would wash the flax more effectually than any hand washing, at the same time to preserve the fibres from being in any way entangled by the operation; but I believe the great difficulty will still remain which I have above alluded to, of two distinct sorts of fibre contained in one leaf. If the New Zealand Society had sent over about fourteen pounds prepared by boiling and washing the gum out in the best manner, practical men here would soon judge if it would be worth while to invent a machine for the washing process. If it were found to answer, all difficulty would be at an end.

It has been stated that New Zealand flax will not stand wet. I am quite convinced, from experience, that lines made of it will stand wet, but I do not think that when made into canvas it would stand well. I had a clothes line continually exposed to all weathers, in a garden, for several years for experiment. On removal from that part, I made use of it to clear a fish pond of duck weed, by attaching it to a pole, where it remained for two or three years, till the pond was filled up; it was then comparatively strong; also a garden line I presented to a friend in the country; it was in almost constant use in all weathers for nearly six years, and at last was stolen, but did not appear at all affected by the weather.

It is also recommended to mix New Zealand flax with other hemp. As a practical manufacturer I quite disagree with this proposition, for this reason, you never can get fibres of so opposite a nature as New Zealand flax and Russian hemp to be of equal tension, consequently the fibre that stretches the least, gets all the strain, and of course the rope more readily breaks; besides, all captains or owners of vessels have justly a suspicion of any rope containing a mixture.

A friend of mine was in a vessel that got on a sand bank; an anchor was taken out, and a new 7-inch warp attached; the sailors hove on the windlass till the rope broke, without at all moving the vessel. As a last resource, they ran out another anchor, and a 5½-inch warp made of New Zealand flax, never expecting it to stand; however, to their great astonishment, the warp stretched and stretched, without breaking, and brought them clear off; the rope was reduced in size to a bare 4½-inch. Now if this rope had been mixed with any other hemp, it would not have stood the severe test it did. I could name similar instances.

Rough and unpromising as the New Zealand flax sent over by the Society appears, if it could be procured in that state sent by merely cutting down, it would be more valuable to New Zealand than the gold of Australia.

I am quite convinced that New Zealand flax, when properly cleansed from the bark, will rank side by side with the best Russian hemp. The great fault has been, persons in their zeal for New Zealand flax, have generalised the thing too much, making it appear fit for anything or every thing. If they would simply bring it into the market in a clean state, it would soon take its position for whatever it is adapted. The Almighty has wisely ordained the various sorts of fibres, like the numerous kinds of timber, for various purposes. For instance, the plaintain fibre is admirably adapted for tow ropes, or warps, from its great elastisity, which good quality would be a highly defective one for the standing rigging of a ship; the same with cocoa nut fibre ropes.

The New Zealand Society ought to have stated the quantity per day a native could prepare in the rough state sent over.

I have been informed by gentlemen just returned from New Zealand, that from the great demand in Australia for all kinds of agricultural produce from thence, the natives are giving up to a great extent the preparation of the flax.

The wool-bands so extensively used in Australia were, until very recently, sold in Sidney for £25 per ton, but are now realising £50 per ton, and I believe they are scarce at that price: much of the wool is now brought over bound with hoop iron, which is not considered equal to the rope band, as it has a tendency to rot the bags where the iron touches.

After what I have said, you will ask, what conclusion do you come to on the subject? My opinion is, very little good will be done till some really practical manufacturer, who has a knowledge of all kinds of machinery for hemp and flax, goes to New Zealand and thoroughly studies the subject on the spot, and ascertains how far native labour and machinery could co-operate together.

The great demand for New Zealand flax in the neighbouring colonies, and the increased price it is sure to realise from a better mode of preparation, could well afford a liberal price to the native for his share in the work, and would be a great inducement to continue the employment.

An intimate friend of mine, a distinguished member of the New Zealand Society, who left England about two years ago, knowing I had spent much time in the study of the New Zealand flax, faithfully promised to let me know what were the prospects of an establishment for the cleansing of the flax in that colony, which promise he has never kept, no doubt hoping that he, with others, will gain all the desired information for their MAGNIFICENT PREMIUM of £50, whereby they will ALL *make their fortunes*. Under the most experienced hands it is a most difficult article to deal with, and I fear, with all the information they can get on the subject, their amateur efforts, without a practical person to guide them, will be doomed to disappointment.

One fact I had almost forgotten to mention, is worth the investigation of medical men: it is asserted by about twenty men (hemp and flax dressers) working at one establishment, that they invariably find their health improved after working a short time at hackling New Zealand flax; the dust and bark that flys off in the operation has a strong bitter taste.

I remain, sir,

Yours most respectfully,

EDWIN WARD TRENT.

NEW FATS AND OILS.

Price's Patent Candle Company, Belmont, Vauxhall, London, 30th October, 1854.

SIR,—As the introduction of new fats and oils for manufacturing purposes into this country has long been a hobby of mine, I trust that you will not suspect me of any wish to throw cold water on the manufacture of Cahoun oil, suggested by Mr. Temple's letter in your last week's Journal, when I repeat that the cahoun oil will not be found, for manufacturing purposes, whether for soap, candles, oil, or grease, worth more than the fine cocoa-nut oil of the Malabar coast, which comes to this country in large quantities. The reason why Mr. Temple finds that the oil expressed in Honduras from the cahoun palm nut is superior to that from the cocoa palm nut, is probably this: The cahoun nuts, being small and without milk, would be dried whole, and thus be protected by their brown skin from any risk of mould, which, without some care is taken, the cocoa-nuts are liable to at the inside, and where broken. These carelessly-dried kernels would yield an oil, if not of so low a quality as that known as Sydney cocoa-nut oil, at any rate not superior to the lowest quality of Ceylon oil, which will not bear comparison with the cahoun. (The guarding against mould involves only a little care and attention during drying.)

As to the question of how to separate the oil from the dried kernel, Mr. Temple must add an 0 to his figures of the steam-power necessary if a regular mill is to be

erected. Some years ago not being able at the time to buy as much cocoa-nut oil as our works required, we established a large mill, with very perfect machinery, in Ceylon, (known possibly to Mr. Temple). We found that after a time the natives of the Malabar coast, with their rude sort of pestle and mortar, beat us, making better oil, not costing more than ours, the native-made oil being supplied at so near the cost of the quantity of dried kernel required to produce it, as not to leave margin for interest and charges of machinery. There is no fear, for many years to come, of the supply of fats of the class of the cahoun being so great as to make their judicious extraction an unprofitable business, or, as long as war cuts off the tallow supply, other than a very highly profitable one. We should recommend a number of the little Malabar coast mills being tried in the first instance, and, rather than any running into expensive machinery, that a supply of nuts, thoroughly dried, should be tried by the seed-crushers in this country. Only last week we had a discussion with a very intelligent gentleman from Venezuela and a South American merchant, on the comparative merits of the cocoa-nut and cahoun oil, which they knew well and spoke highly of.

If all those in authority exerted themselves as Mr. Temple has done, in drawing attention to the useful products of their districts, we should soon have at least a great influx of new fat and oil seeds.

Yours truly,

G. F. WILSON.

NEW DESCRIPTIONS OF INDIAN OILS.

Sir,—I have been requested by the Agricultural and Horticultural Society of India, to present to the Museum of the Society of Arts, specimens of four sorts of Indian Oils, three of which, though, I believe, at present unknown in commerce, may be found useful hereafter for various purposes, as substitutes for more expensive oils, viz.:—

No. 1, A and B.—Oil of the "Junglee Bädum," (*Sterculia fœtida*) of the south of India, in a boiled and unboiled state. The tree yielding this oil grows to a height of from thirty to forty feet. The seeds are produced in large pods, three, four, and five joined together, with a rough velvet coat outside (red on the side exposed to the sun), in shape and appearance not unlike green peaches; within these pods the seeds reside, about six in each, or from twenty-four to thirty seeds under one cover. The seeds, though producing the fine clear oil shown by these specimens, are not, that I am aware of, turned to any profitable account by the natives of India. From an experiment conducted on a small scale, by the gentleman (Mr. W. Haworth, of Calcutta) who submitted this oil to the Society, it was found that rather more labour is required in extracting the kernel from the seed than in the manufacture of castor oil; in other respects the process is just the same.

The following is a copy of the memorandum of produ furnished by Mr. Haworth:—

	Br.Md.	Srs.	Chs.*
Original quantity of seed . . .	1	2	0
Which produced of clear kernel .	0	22	0
And of husk and sweepings . .	0	20	0
Produces of unboiled or raw oil .	0	6	5
„ cake†	0	15	4
Loss in weight	0	0	7
	0	22	0

* 16 chittacks make one seer, and 40 seers one maund, which is about equal to 80 pounds English.

† More oil, of an inferior quality, could have been obtained from this cake by putting it through a second process.

Four seers of the above oil were boiled to extract the water, as in the manner of castor oil, and produced seers 3 2 of oil fit for the market.

It will be observed that both these specimens have deposited a quantity of sediment (stearine ?)

2.—Oil of the "Desee Akroot," or country walnut. (*Aleurites triloba*, Roxb.) This tree is found in various parts of India, growing to a height of about forty feet. The oil is yielded by expression from the kernel. A full-grown tree produces about 8,000 nuts, resembling in taste the common walnut, but they are not considered wholesome to eat unless kept for a year or more. Dr. Riddell, of Bolaram, to whom the Society is indebted for some useful information on the subject, states that the nut yields fifty per cent. of the oil; that "one hundred of the kernels from as many nuts, gave exactly five ounces of fine yellow sweet oil." In a communication from Dr. Hunter, of Madras, to whom a specimen of the oil was sent by Dr. Riddell, it is stated that "the oil appears to resemble linseed oil in smell, and in other properties, but it is pale, and more limpid. It is of more commercial value than linseed oil, as it is less liable to rancidity—does not become so dark in drying, and is more esteemed by artists. The sample forwarded had been tried in oil-painting, and was found to be well suited for the purpose." And again: "the oil is considered a good substitute for linseed oil, and one that may hereafter prove of commercial importance." The specimen now sent is a portion of a small quantity presented to the Agricultural and Horticultural Society by the late Dr. Wallich. The tree, I may observe, is easily reared, but is not common in Lower Bengal. It commences bearing fruit after the third year. It is not likely to answer as a substitute for almond or olive oil, except, perhaps, for a few purposes, it being a drying oil, though it does not dry so quickly as linseed oil. Dr. Hunter observes, that it does not get stiff and cloggy like the linseed oil, nor does it turn brown in drying.

3.—Oil of the "fychee" of the Rohilkund district, a species of *Erphorbia*.* The fychee is a weed to be met with in various parts of Upper India. Mr. Tonnochy, deputy collector of Bolundshohur, who was the first to bring this oil to the notice of the Society, reports that "the plant in its luxuriant state grows about two feet high, and three feet in circumference. The seed, after it has been husked, that is, divested of its outer coating, yields about 1-5th to 1-6th of its weight of oil, the quantity depending upon the maturity which the seed had attained at the time of its being gathered." From experiments made in India it would appear that this is an excellent drying oil, conferring a very high degree of gloss to paint, fully equal to linseed oil. Mr. Tonnochy observes that it "apparently possesses greater fluidity, and does not, like linseed oil, turn thick and ropy by age; and, as it hardly emits any smoke when burning for light, and forms no head, it must be taken to be far more pure from extraneous matter than linseed oil."

4.—Oil of the "Sirgooja" or "Ramtil" (*Verbeseria sativæ*, Roxb.; *Ramtilla oleifera*, Wright; *Guizotia Abyssinica*, Cass). This plant is cultivated in various parts of Bengal and Behar, and also in Western India. In Bengal it is known under the name of "Sirgooja," and its oil is used as food by the poorer classes in Bengal and all over Chota Nagpore, who raise it in large quantities for this purpose. Mr. T. M. Robinson, addressing the Agricultural and Horticultural Society on the subject, remarks—"The oil mixes with colours quite as well as linseed oil, and it will dry without litharge, although a little improves it; as a burning oil it is certainly not equal to cocoa nut and many others, even when clarified by boiling on water,

* I have recently received a specimen of this plant from Mr. Bridgman, of Gorruchpore, which I have transferred to Dr. Royle, who has kindly promised to examine it, with the view of identifying the species. Mr. Bridgman informs me that it is known in his district as the "Titlee."

without which it gives a very dull red light." It is known in Western India as "kalee till," where the oil is likewise consumed by the poorer classes of cultivators and the population generally; the oil cake is in high esteem for milch cows. From experiments carefully made by Professor Solly it would appear that the seed yields about thiry-five per cent. of oil, or ten per cent. less than "Til" seed (*Sesamum orientale*) known in commerce as the *Gingelie* oil. The seed has been occasionally imported from Africa as "Niger," and from Bombay as "kersanee" seed, and is consequently better known than the three other sorts above referred to.

In conclusion, allow me to add, that the Agricultural and Horticultural Society will be much obliged if the Society of Arts will submit these specimens to persons practically acquainted with oils, and communicate the result, in due course, for the information of the commercial members of the community, and others interested in the development of the agricultural riches of India.

I am, sir,

Your obedient servant,

A. H. BLECHYNDEN,

Secretary to the A. and H. Society of India.

76, Ebury street, Pimlico, London, 20th October, 1854.

STATISTICS OF THE NEW YORK EXHIBITION.

Sir,—The following statistics of the New York Exhibition may be found interesting. They form part of the general report of M. Emile Barthe, who was charged by the Minister of Agriculture, Commerce, and Public Works of France, to inspect the Exhibition and report thereon to the government. In the awards of the silver and bronze medals, France carried the palm over all nations, and in the honourable mentions Great Britain stands fifth in the list. It would be interesting to analyse still further these statistics, and ascertain from them wherein our neighbours and other countries particularly excel.

I am, sir,

Yours obedient servant,

LEONE LEVI.

12, The College, Doctor's Common, London, October 31st, 1854.

Total Number of Exhibitors.

United States	1955
Zollverein and Germany	638
England	456
France	396
Austria and Lombardy	297
Italy	220
Canada	149
Netherlands	141
Switzerland	103
British Guiana	98
Belgium	55
Newfoundland	25
Sweden and Norway	11
Cuba	5
Spain	2
Portugal	2
Russia	2
Denmark	1
Turkey	1
China	1
Mexico	1
Hayti	1
Liberia	1
Exhibitors of mineral produce	272
Total	4834

Statistics of the Premiums awarded at the New York Exhibition. Relation between the Number of Exhibitors and the Premiums as regards the Principal Nations.

Nations.	Silver Medals.	Bronze Medals.	Honourable Mention.	Totals.	Number of Exhibitors.	Proportion per cent.	Proportion of Prems., 100 for so many Exhibitors.
United States	82	458	598	1138	1955	58	100 in 173
Zollverein	5	113	146	264	638	40	„ 244
Gt. Britain & Ireland	10	129	111	250	456	55	„ 182
France	18	144	105	267	396	67	„ 149
Austria and Lombardy	1	31	32	64	297	22	„ 454
Canada	—	10	26	36	149	25	„ 409
Italy	1	46	47	94	220	43	„ 232
Holland	1	32	37	60	141	42	„ 238
Switzerland	—	22	17	39	103	38	„ 263
Belgium	—	11	16	27	55	49	„ 204
Total	118	986	1135	2239	4410	51	100 in 196

The following are the proportions of each kind of Premium:—

1st.—Silver Medals.

France	45	per 1000 Exhibitors.
United States	42	„ „
Great Britain	22	„ „
Zollverein	8	„ „
Holland	7	„ „
Italy	4	„ „
Austria	3	„ „

2nd.—Bronze Medals.

France	36	per 100 Exhibitors.
Great Britain	28	„ „
United States	24	„ „
Switzerland	21	„ „
Belgium	20	„ „
Zollverein	18	„ „
Holland	16	„ „
Italy	15	„ „
Austria	10	„ „
Canada	7	„ „

3rd.—Honourable Mention.

United States	31	per 100 Exhibitors.
Belgium	29	„ „
France	27	„ „
Holland	26	„ „
Great Britain	24	„ „
Zollverein	23	„ „
Italy	21	„ „
Switzerland	17	„ „
Austria	11	„ „
Canada	11	„ „

Extent of the Building.

Portion dedicated to the Exhibition of Produce.

Interior of original building:—

Square Metres	7,277
First floor	5,799
	13,076

Additional Buildings.

Galleries of machines	1,477
Galleries of pictures	844
Galleries of mineralogy	135
Cafés, &c.	474
Total square metres	16,006

PROPORTION OF PLACE GRANTED TO EACH NATION.

		Square Metres.
United States		4501
Great Britain and Ireland	3,454	3,724
British Guiana	67	
Canada, Newfoundland, Prince Edward's Island	293	
France		1,894
Zollverein	974	1,590
Austria & Lombardy	664	
Italy		474
Switzerland		271
Holland and Japan		271
Denmark		203
Belgium		235
Egypt	8·50	30
Spain	4·25	
Hayti	4·25	
Sweden	2·12	
Turkey	2·10	
Mexico	1.35	
Portugal	1·06	
Russia	4·06	
Liberia	1·06	
		13,093

FRANCE.

NATURE OF INDUSTRIES EXHIBITED BY FRENCH EXHIBITORS:—

Clothing (habillemens)	34
Perfumery (parfumerie)	30
Philosophical instruments (physique chirurgie)	27
Jewellery (bijouterie, orfévrerie, et bronzes)	23
Leather, &c. (cuirs, fourrures, et crins)	22
Sculpture	21
Articles of food	21
Chincallerie	22
Tapestry	20
Vegetable and animal substances	19
Typography	17
Chemical products	16
Woollen articles (articles de laine)	15
Silk articles (articles de soie)	15
Decorations (decorations)	13
Building materials and carriages	13
Glass	10
Porcelain	8
Musical instruments	8
Mixed fabrics (tissu mêlé et châles)	6
Agriculture	4
Articles of cotton	3
Painting (teinture)	3
Cutlery	4
Marbles	2
Vegetable produce and aminal substances	3
Linen articles (étoffes de lin)	1
Civil engineering	3
Military engineering	5
	396

Proceedings of Institutions.

POOLE.—The opening lecture of the present session at the Mechanics' Institute was delivered by G. Dawson, Esq., A.M., on the 5th ult. The chairman, Mr. A. S. Hodges, one of the vice-presidents, stated, that during the past year the Institute had been placed in union with the Society of Arts; that about 120 volumes had been added to the library, which now contained nearly 500 volumes; and that the number of members at the present time was between 120 and 130. On the 19th ult., H. D. Seymour, Esq., M.P. for the borough, delivered a lecture on "the History of the Black Sea and the Caucasus."

To Correspondents.

*** The Spilsby Literary and Scientific Institution has agreed to a general interchange of privileges.

ERRATA IN LAST NUMBER.—Page 809, column 2, line 4, for 40s., read 43s. 4d. In second Dr. account, line 5, for "cost of *sowing*," read "cost of *seed*;" and for second Cr. account substitute following:—

	£	s.	d.
By cash received for seed—			
89½ bshls., at 90	£40	5	6
12 do., kept	5	8	0
Inferior seed for cattle	2	1	0
Total value of seed	£47	14	6
By cash received for flax fibre—			
379 stones of 16lbs., at 6s.	113	14	0
	£161	8	6

MEETINGS FOR THE ENSUING WEEK.

MON. Royal Institution, 2.—General Monthly Meeting.
Entomological, 8.
Geographical, 8½.
TUES. Horticultural, 2.
WED. Literary Fund, 3.
Pharmaceutical, 8½.
FRI. Astronomical, 8.
SAT. Royal Botanic, 3¾.
Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Oct. 27th*, 1854.]

Dated 12th September, 1854.

1984. R. Laming, Carlton villas, Maida vale—Purifying gas and obtaining ammonia.

Dated 20th September, 1854.

2024. A. Tylor, Warwick lane, and H. G. Frasi, 84, Herbert street, New North road—Water closets.

Dated 4th October, 1854.

2128. F. S. Thomas, 17, Cornhill—Locomotives.
2130. D. Chalmers, Manchester—Railway breaks and communicating signals.
2132. J. Disher, Edinburgh—Washing apparatus for brewing.
2134. T. Crossley, Scots' yard—Printing blocks. (A communication.)
2136. W. H. Phillips, Camberwell new road—Rotatory steam-engines.
2138. J. Perry, Leeds—Preparing wool for combing.

Dated 5th October, 1854.

2140. W. B. Adams, 1, Adam street, Adelphi—Rails and fastenings.
2142. T. Harris, Nantyglo—Separating steam from condensed water in transit to cylinder.
2144. W. Frost, Wine office court—Steam-engines.
2146. J. A. Lander, Southwark bridge road—Spikes and nails.
2148. F. Durand, Paris—Circular looms.

Dated 6th October, 1854.

2150. J. Britten, Birmingham—Chimney-sweeping machines.

Dated 7th October, 1854.

2152. W. Chambers, Bury—Beetling cotton.
2154. R. W. Uren, Fogginton—Bricks and tiles.
2156. J. B. S. de Méritens, Paris—Dyeing fibrous substances.
2158. W. Johnson, 47, Lincoln's inn fields—Windlasses. (A communication.)

Dated 9th October, 1854.

2160. J. Aikman, Paisley—Roller for scouring and finishing textile fabrics.

Dated 10th October, 1854.

2162. W. Croskill, Beverley—Portable railways.
2164. H. T. White, Hammersmith, and G. Roberts, Great Peter street—Self-ventilating hats, caps, &c.
2170. H. Crossley, Camberwell grove—Waddings for cannon and fire-arms.
2172. M. A. C. Mellier, Paris—Paper.

Dated 11th October, 1854.

2176. S. and J. Rogerson, Manchester—Production of ornamental patterns upon velvet and other woven fabrics.
2178. J. Jackson, Belfast—Preparing tow for roving.

Dated 12th October, 1854.

2180. E. J. Seville, Brixton—Hats. (A communication.)
2182. J. T. Chance, Birmingham—Manufacturing articles from whinstone.
2184. J. Hood, Newmilns, Ayr—Ornamental weaving.
2186. F. A. N. Delsarte, Paris—Tuning pianos.

Dated 13th October, 1854.

2188. J. L. Hancock, Milford haven—Ploughing machine.
2190. A. Dobson, Belfast—Looms.
2192. G. Weeks, Dorset street, Portman square, and G. Pinner, Globe road, Mile end—Furnaces.

Dated 19th October, 1854.

2198. S. Hjorth, Copenhagen—Magneto electric battery.
2200. C. Holt, New road—Fastenings for laths of iron bedsteads.
2204. J. H. Young, 66, College street, Camden town—Brooms.
2206. W. J. Bisseker, Birmingham—Labeling bottles.

WEEKLY LIST OF PATENTS SEALED.

Sealed October 27th, 1854.

953. Thomas Griffith Owen, Shrubland road, Dalston—Improved construction of portable filter.
958. Henry Clarke, Lincoln—Improvements in fire-arms and ordnance.
965. James Heywood, Ratcliffe bridge—Improvements in machinery or apparatus for printing yarns.
966. Alexander Mills Dix, Salford—Improvements in apparatus for regulating or governing the supply or pressure of gas as it is conducted from the main to the burners.
967. Benjamin Dixon, Birmingham—Improvements in the joints of measuring rules.
1036. Charles Liddell, Abingdon street—Improvements in the permanent way of railways.
1110. John Henry Johnson, 47, Lincoln's inn fields—Improvements in printing telegraphs. (A communication.)
1172. Joseph Albert Corwin, Newark—Improvements in knitting machinery.
1194. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn—Improvements in machinery for making bags of paper or other suitable material.
1447. John Wilder, Reading—Improvements in agricultural rollers and clod crushers.
1484. John Lamb, Newcastle under Lyne—Improvements applicable to machines for cutting paper.
1566. Thomas Mayos Woodyatt, Kinver Mills, Stafford—Improvements in consuming or suppressing the smoke of steam-engine boiler and other furnaces.

Sealed October 31st, 1854.

973. William Augustus Archbald, 37, Stanhope street, Gloucester gate—Improvements in the manufacture of concrete cane-juice and sugar.
979. Thomas Jackson, Commercial road, Pimlico—Improvements in the manufacture of paper from flax, hemp, jute, Indian grass, and other fibrous vegetable substances, or the tow produced from such fibrous substances.
980. William Hutton, Portland town, Saint John's wood—Improved machine for the manufacture of bricks.
981. Jos. Mayer, Burslem, and John David Kind—Improvement or improvements in attaching door-plates, letters and figures made of glass, porcelain, earthenware, or other vitreous or semi-vitreous substance, to doors and such other surfaces as the same may be required to be attached to.
983. Richard Waller, Leeds—Improvements in valves applicable to steam-engines and other purposes, and in apparatus connected with the same.
990. Benjamin Bishop and Joseph Dyer, Birmingham—Improvements in the manufacture of stop-butts and other hinges.
995. Eugéne Hippolyte Rascol, Catherine street, Strand—Improved connection for driving straps, bands, or belts. (A communication.)
1000. Charles Barlow, 89, Chancery lane—Improvements in meters for accurately measuring water and other fluids discharged from pipes, sluices, or vessels. (A communication.)
1007. Adrien Georges Amant Martin, and Casimir Lefol, Paris—Improvements in the manufacture of iron wheels.
1010. Arthur Warner, 11, New Bond street—Improvements in the manufacture of metal sheets for sheathing ships and other vessels, and for other uses.
1019. Richard Waller, Leeds—Improvements in engines and apparatus and means of obtaining motive power from liquids, vapours, gases, or air, parts of which invention may be applied also to ordinary steam or other engines.
1027. Henry Moore Naylor, Birmingham—Improved instrument for cutting various articles of food.
1030. George Thomas, 16, Osnaburg street, Regent's park—Improvements in the construction of the framework of upright pianofortes.
1039. William Coles Fuller, Bucklersbury—Improvements in the adaptation of India rubber springs.
1041. James Ward Hoby, Renfrew, and John Milner, Stanley street, Pimlico—Improvements in steam-engines.
1045. John Lawson, Glasgow—Improvements in drawing ships out of water.
1057. William Waite, 7, Gloucester street, Gloucester gate—Improvement applicable to the construction of sewers, drains, and pipes for the conveyance of sewage, water, or gas.
1081. Richard Archibald Brooman, 166, Fleet street—Improvements in the manufacture of wheels for railway carriages.
1147. Louis Emile Dufour, Paris—Improvements in breech-loading fire-arms.
1185. Henry Kraut, Zurich—Apparatus applicable to cocks, taps, and valves.
1205. George Alfred De Penning, Calcutta—Appendage to screw propellers.
1215. Charles King and Edward Sutton Benfield, Chenies street—Improved machinery for cutting and carving wood, stone, and other materials.
1240. Antoine Chavanes, 8, Rupert street, Haymarket—Improvements in apparatus for indicating the time a public carriage is and is not engaged for hire.
1269. Bewicke Blackburn, Clapham Common—Improvements in the manufacture of pipes when applying slate for such purpose.
1288. John Young, Wolverhampton—Improvements in locks and latches.
1319. Peter Armand le Comte de Fontaine Moreau, 4, South street, Finsbury—Improvements in treating bitumen.
1349. Robert Reeves, Bratton, Westbury—Improvements in drills for drilling liquid manure.
1353. William Edward Newton, 66, Chancery lane—Improved manufacture of pigments or colouring matter.
1358. Henry Dembinski, Paris—Improvements in heating apparatus.
1365. John Fry Heather, M.A., Woolwich—Improvements in apparatus for regulating the flow of gas.
1383. Auguste Edouard Loradoux Bellford, 16, Castle street, Holborn—Improvement in propelling vessels in water.
1401. Reuben Bottomley, Rochdale, and David Schofield, Oldham, and Henry Spencer, Rochdale—Improvements in machinery or apparatus for spinning and doubling cotton and other fibrous materials.
1418. William Coltman, High street, Leicester—Improvement in knitting frames.
1473. Joseph Birch, of Crag hall, near Macclesfield—Improvements in marine and other steam engines.
1585. Jonas Whiteley, John Slater, and William Henry Crossley, Halifax—Improvements in machinery or apparatus for preparing and spinning wool and other fibrous substances.
1611. Charles Harratt, 2, Royal Exchange buildings—Improvements in fastenings for ship-building.
1625. Auguste Edward Loradoux Bellford, 16, Castle street, Holborn Improvements in kneading machines.
1661. Alexander Law, Glasgow—Improvements in cranes or lifting and lowering apparatus.
1687. Alfred Vincent Newton, 66, Chancery lane—Improved mode of extracting sulphur from compounds of India-rubber and sulphur.
1705. William Rye and William Crowther, Oldham—Improvements in steam engines.
1807. John Pretty Clark, Leicester—Improvements in the manufacture of reels for reeling of cotton, linen, thread, silk, or other fibrous material.
1809. William Edward Newton, 66, Chancery lane—Improved machinery for cutting files and rasps.
1811. John Coney, Birmingham—Improved construction of cork-screw.
1826. James Hodgson, 16, Sweeting street, Liverpool—Improvements in the construction of iron vessels.
1827. James Allen and James Taylor, 33, North street, Aberdeen—Improvements in the construction of rotatory engines.
1845. William Hunter Meriwether, Morley's hotel, Strand—Improvements in producing surfaces for lying, reclining, or sitting upon.
1847. William Edward Newton, 66, Chancery lane—Improvements in carding engines.
1855. Peter Fairbairn and Thomas Greenwood, Leeds—Improvements in machinery for preparing to be spun cotton, wool, flax, silk, and other fibrous materials.
1862. Peter Armand le Comte de Fontaine Moreau, 4, South street, Finsbury—Improvements in apparatus for illuminating.
1865. Joseph Henry Tuck, Pall Mall—Improvements in packing for pistons, piston rods, valves, and other uses.
1873. William Smith and Thomas Phillips, Snow hill—New mode of constructing and connecting pipes or tubes for gas, water, or steam purposes.
1877. Peter Fairbairn, Leeds, and Robert Dempster, Bessbrook, near Newry—Improvements in machinery for carding, drawing, and spinning tow and tow waste.
1884. John Gray, 25 and 26, Strand street, Liverpool—Improvements in the mariner's compass.
1887. Joseph Burridge, 70, Great Portland street—Improvements in apparatus for closing fire-places.
1923. Richard Dugdale Kay, Accrington—Improvements in machine printing.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Sept. 26.	3651	Improved Seating for Valves	John Gregory	3 Suffolk place, East India road.
27.	3652	Duplex Meat Hook	Stephen Plummer	Upper Holloway.
31.	3653	The Devonshire Collar	Dent, Allcroft, and Co.	97 Wood street, Cheapside.
Nov. 1.	3654	Improved Hand Railway Lamp	Parrott and Peckin	32 and 33 Easy row, Birmingham.

Journal of the Society of Arts.

FRIDAY, NOVEMBER 10, 1854.

INTRODUCTION OF SILK-WORMS FROM ASSAM INTO MALTA AND ITALY.

The following despatch and extract have been received from the Colonial office :—

Valetta, October 19th, 1854.

My Lord Duke,—I annex herewith some further remarks copied from the *Turin Gazette*, which will show the progress making in rearing the Castor-oil silk-worm in France and Italy.

2. I enclose also a small specimen of silk of the *Bombyx Cynthia*, received from Mr. Piddington, of Calcutta; and I have pleasure in being now enabled to send to your Grace small specimens of the same silk spun into thread from worms hatched and reared in Malta.

3. On comparing these specimens it will be found that there is little difference between them. We have here in Malta gone through all the operations as practised in Assam, excepting weaving the silk thread into cloth. For this we have not yet a sufficient quantity, but the worms are breeding here faster than we can rear the Castor-oil plant. They are now (in October) thriving in the open air, and as they consume the leaves of the Castor-oil, they travel from plant to plant, feeding upon several, but apparently doing well only on the *Ricinus*.

4. I beg your Grace will do me the honour of forwarding the extract from the *Turin Gazette*, along with these samples, to the Society of Arts.

5. The French Government have applied, through their Consul, for a larger quantity of eggs, both for France and Algeria, and I have been enabled to supply him with as many as he requires.

6. In consequence of statements published in the *Journal of the Society of Arts*, I have had an application from the Agricultural and Horticultural Society of Grenada, in the West Indies, for eggs of this silk-worm. Some fresh cocoons will be sent from hence to Grenada, and I am not without hope, from the way in which they are being conveyed, and with the assistance of the Directors of the Royal Mail Steam Company, that eggs in a sound state will reach the West Indies.

I have the honour to be,
My Lord Duke,
Your Grace's most obedient, humble servant,
W. REID, Governor.

His Grace the Duke of Newcastle, K. G., &c., &c.

EXTRACT.

"Culture of Silk in Piedmont.—Sig. Vincenzo Griseri, the first person who has undertaken the rearing of the *Bombyx Cynthia* worm upon leaves of the Castor-oil plan., and the first who introduced it into France, has now terminated his second experiment of rearing the said worms. Sig. Griseri, conceiving the great service that these valuable insects might render in the production of silk, dilligently distributed them to the various provinces of the State, as also in Brianza, and has received from all quarters accounts of a successful result. He succeeded last spring in rearing these worms even upon the Castor-oil plants while in the ground and in the open air, in the garden of the Chemical Laboratory, under the observation of Chevalier Cantu, Director of that establishment, the Minister Conte de Cavour, His Excellency the Duke of Guiche, Minister Plenipotentiary of France, Professors Abbenne and Borsarelli, and many other distinguished personages. From this mode of treatment Sig. Griseri discovered that these worms do not suffer from a low temperature, nor from strong winds, nor from continued rain, but on the contrary, he obtained finer and better formed cocoons than those produced by the ordinary method, all which circumstances have been submitted to the Royal Academy.

"After the first experiment he published, through the printers Chirio and Mina, the mode of bringing up these worms. In the second experiment he also fully succeeded, and found that the cocoons were superior to those brought from Calcutta and Malta; on which account he came to the conclusion that this new silk-worm, a native of Bengal, has found its own climate in our country.

"An experiment is now being made as to the mode of extracting the silk, which has been confided to the care of able throwsters, and from some samples already produced, it results that this silk is finer and more elastic than our common silk; further, two more important facts have just been communicated by Sig. Griseri, namely, that he has succeeded in feeding these worms exclusively upon willow leaves and lettuce leaves, and has obtained cocoons similar to those produced from the leaves of the Castor-oil plant. During these experiments Sig. Griseri was assisted by the Countess Marianna Antonini, an experienced producer of silk, and Sig. Francesco Comba, a distinguished naturalist, who kindly offered him their aid and advice. Sig. Griseri intends next spring to try the rearing of our native grubs, the *Pavonia Major*, and the *Pavonia Minor*, which feed upon various wild plants, and yet produce silk, as he has already confirmed this by experiment. There is reason to believe from these experiments made by so celebrated a silk-grower, well-known by the numerous services he has rendered in rearing and improving the race of silk-worms, that the culture of silk will receive a development, the limit of which can hardly be foreseen, as the object is nothing less than to convert the vegetable matter of the most common leaves into the valuable substance of silk."

IMPROVEMENT IN THE PROCESS OF SILK MANUFACTURE.

(From the *Manchester Examiner*.)

The first process of the silk manufacture—the reeling of the silk from the cocoons—has never, we believe, hitherto even been attempted to be carried on in this country, and it is not unreasonable to attribute, in no small degree, to this circumstance the want of expansion which has characterised the silk trade in England. The reeling of the silk from the cocoons is performed in the countries where the silk is produced; to suppose, indeed, that they could be packed up in China or India, and reeled in England, was regarded, if any one had the temerity to suggest it, as a "simple impossibility"—the

climate alone, it was said, if there were no other difficulty, would not admit of it; but, to go further, and suppose that the reeling here can be performed in a manner superior to that of the silk generally imported, has, until recently, been doubted by many well experienced in the business, some of whom, however, have seen reason to alter their views.

For any trade duly to expand, it is necessary that the manufacturers should be supplied with the raw material; but in the silk business, what is really called the raw material is really nothing more than the material in a clumsy state of partial manufacture. If the cotton imported from America, for instance, had hitherto been in the state of ill-spun yarn, it is easy to conceive what effect that would have had upon the cotton manufacture, both in point of quality and quantity. China silk is imported in bales, composed of bundles called books, which may weigh about nine pounds; the books are divided into mosses, as an eight-moss book or a nine-moss book, and these are subdivided into hanks or slips, of which there are generally eight in a moss. India silk is imported in bales already divided into skeins twisted like a short piece of rope. In this state it goes into the hands of the silk-throwster, who puts it through divers operations to prepare it for the dyer and manufacturer. The hanks or skeins are placed upon reels or swifts, which revolve slowly, and the silk in its imported (but separated) state, is run off upon bobbins. This brings it into a condensed and tangible shape, the breakages of the thread (caused by the subdivision) being pierced, so as to make it continuous. In a second stage, the silk is wound upon another bobbin, the fibre having to slide through a steel groove, which removes any dirt or extraneous matter which may adhere: this is called the cleaning process. In a third operation, a single thread is spun for organzine or warp; and by a fourth two threads are doubled together, after which they are thrown, and then the organzine is complete, so as to bear the action of the reed. If the silk is intended for tram or weft, the first process of spinning the single thread is dispensed with; and after the cleaning two more threads are doubled, or run together on one bobbin. These are then thrown, or slackly twisted, and the tram is complete. A sixth process brings the throwster's manipulations to a close, the spun silk being again thrown into skeins, ready for the dyer, first being subjected to some suitable mode of tying, to prevent entanglement. These processes, as may readily be conceived, add considerably to the cost of the silk. Hence the present price charged for throwing China tram is 2s. 6d. to 3s. per pound on the cost of the raw silk of about 15s., or nearly 20 per cent.; and for organzine from 3s. 6d. to 4s., or 25 per cent. Consequently any plan which will supersede these operations, or any portion of them, must be of moment.

We give these particulars in order to render more intelligible (especially to those not familiar with this important branch of business) the value of a machine that has recently become the subject of a patent, which promises not only to solve the whole problem of reeling silk direct from the cocoons in this country, but also of dispensing with at least three of the five operations just enumerated. We have intimated above that silk from China and India comes to us in a clumsy state of partial manufacture, instead of in its raw condition—namely, in the cocoon. In India, China, &c., as is well known, the peasants grow their own mulberry-trees, and reel the silk produced at their own homes, the various parcels being subsequently collected from them, and often packed by the merchant in the same bale. It can be plainly discovered, from the unevenness of the fibre as received, that the natives, in reeling the silk, are not particular as to the precise number of filaments they put into the thread. They probably commence to reel from ten or fifteen cocoons, but do not piece up each filament as it becomes broken or exhausted, but allow the breakages to accumulate perhaps to the number of five, six, or more, and then connect the broken filaments simultaneously. Of course the effect of this is, that the thread suddenly changes from fine to course; and as the irregularities can never afterwards be removed, it tends to mar the uniformity of the manufactured goods. Had the throwster here control over the first stage of the operation, aided by suitable machinery, he would be able to produce China and Indian silk of a degree of fineness and value equal to the best Indian silk; while the manufacturer would be able to fabricate any class of goods he might desire, instead of, as at present, being compelled, to a considerable extent, to manufacture a kind of silk he can find in the market. We are assured that China silk is more beautiful every way than Continental silk; that there is more virtue in the thread, and it will take a brighter dye; yet, from the irregularity referred to, the thickness of the thread in the same skein sometimes varying 15 or 20 per cent., it is less valuable in the market.

This again brings us to the question, Can silk be reeled in this country clear of the above imperfections? Within the last few days we have had the opportunity of inspecting a reeling frame at Middleton, patented by Mr. John Chadwick, silk manufacturer, Manchester, and by Mr. Thomas Dickins, silk dyer and printer, Spring Vale Dyeworks, Middleton, where not only was the operation of reeling from the cocoon rapidly and efficiently performed, but the silk was carried directly upon the bobbins, cleaned and spun, thus dispensing with a large portion of the throwster's tedious and expensive labours. The machine consists of an iron frame-work, about four feet wide, four feet high, and four yards long. On each side there is a row of thirty bobbins, arranged vertically, about eighteen inches from the floor. They are furnished with the ordinary flyers for encircling them with the thread as it is produced; and to each of the sixty bobbins there is a motion, by which each can be thrown out of gear independently of the others. Over the bobbins there are on either side thirty copper troughs or basins, containing water, at a temperature of about 120 degrees. In each of these troughs, when we saw them, there were floating six Syrian cocoons, except in one instance, where the cocoons were China ones. The silk was being reeled from these 360 cocoons by means the least complex in their nature. The continuous fibre does not lie in circles upon the cocoon, but describes a form very similar to the figure 8, placed on the surface in a longitudinal direction, thus ∞. As the filament is drawn off, the cocoons have a slight oscillating motion in the water; and to keep them from entangling one another, the basins are provided with brass wires, of proper shape, a little above the surface of the water. Nearly a foot above each basin there projects a wire, about three inches long, covered with some soft woollen or other substance; and over this material each set of six filaments is drawn, the effect being to cleanse the filaments from superfluous moisture, and from any impurities which may adhere to the slender thread. To perform this object, the throwster (in a second stage) resorts to a special winding, the thread being drawn through a groove; since, however, it is then in a dry state, the slight impurities are not likely to be so easily removed from the fragile fibre as when it is moist. After descending from the cleansing part, the six filaments pass through a small curve made of glass, and are received by the flyer, and spun upon the revolving bobbins. By this treatment the winding into hanks, as performed by the silk-growers abroad, the winding on bobbins from the hank, and also the cleaning process, as performed here by the throwster, are entirely dispensed with; a perfect thread of silk, twisted or spun, being furnished at one operation. So that if the silk be intended for organzine or warp, it only requires the further process of doubling and throwing; but if for tram, one process is sufficient, as thread can be varied in thickness by simply increasing or decreasing the number of cocoons placed in the basins.

We observed that one young girl could easily superintend 30 troughs, and a continuous thread can be produced

to fill a bobbin, free from knots or piercings; for as any single filament breaks, the new end has simply to be placed in contact with the other five, and becomes one with the thread; and, as the cocoons end at different places, the whole is produced in the same number of fibres. A bobbin of China silk was inspected of double the fineness of any China silk imported, equal to the finest French thrown silk, and calculated to be worth more by 8s. or 10s. per pound than the same kind of silk would have been if reeled from the cocoons in China—A prior process of preparing cocoons for the reeling is carried on in the same room. They are placed for a few minutes in a solution of soap and hot water. By means of a perforated ladle they are then removed to an adjoining trough of warm water, and here, with surprising facility, the principle end of the silk on each cocoon is found by the hand of the girl who discharges that duty. The water detaches the end, and she catches it from the floating surface, sometimes taking up half-a-dozen such ends of silk at a time. A little is drawn off, and then these cocoons are placed in a basin, the ends hanging over the side. The two girls who superintend the reeling fetch them as they may be required, and place them in a trough at the end of the reeling frame, from which they remove them to the respective basins, to substitute the cocoons as they become exhausted of silk. The apparatus strips the silk very perfectly—in fact, down to the thin covering which encloses the chrysalis. It is stated that four pounds weight of cocoons abroad or in France (where reeling has been performed for a few years with an instrument nearly the size of this for two sets of cocoons) will produce one pound of silk, but that by this process more than one pound weight is obtained. A new channel in the business will require to be opened—that of importing the cocoons. These have never been supplied because they have never been demanded; but we suppose they would follow the usual law in this respect which rules other merchandise, and find their way to a good market.

The patent is drawn so as to secure to the patentees the entire ground of reeling or winding (either with spin or without) direct from the cocoons, on bobbins or any other surface, so as to dispense with the loose skein of raw silk; and it is not improbable, now the ground is broken, that other machines, with the license of these patentees, may be applied to the same object. We understand that the principle of the invention originated with Mr. Chadwick, and that it has been patiently and perseveringly worked out to its present state of efficiency by Mr. Dickins. We are pursuaded that all who witness the machine in operation will feel convinced of its mechanical merits and commercial importance.

ALLEGED NUISANCE ARISING FROM THE CITY GAS WORKS.

Mr. John Simon, the City medical officer, has recently made the following report to the City Commissioners of Sewers on this subject:—

"I will first mention that two years ago (I believe at the Lord Mayor's desire) legal proceedings were commenced on the part of the corporation against this same establishment, when I was directed to make inquiry, and procure chemical assistance, with a view to the expected trial. As judgment has not yet been given in these proceedings, which may, therefore, still be considered pending and liable to be affected by your present consideration of the subject, I thought it desirable that my recent visit to the gasworks should be made in company with Mr. T. Taylor, the gentleman already retained as chemical witness in the case.

"What I have now to state on the matter of your reference may be rendered clearer by your considering generally the process of gas manufacture, and observing in which of its stages the liabilities to nuisances arise.

"When coal is heated in retorts for the preparation of gas there are volatilized from it, together with the materials used for illumination, certain very offensive products. Some of these tend to be deposited from the distilled vapour in proportion as it cools; others require to be withdrawn from it by specific chemical agencies. All gasworks present arrangements for effecting in succession these two acts of separation; the first in an apparatus known as the condenser, the second by one called the purifier.

"Within the condenser constant currents of cold water reduce the distilled vapours of coal to a temperature which allows many of their ingredients to revert from a vapourous to a fixed state. An abundance of steam falls as water, rendered fetid by the sulphurous and ammoniacal ingredients which it has dissolved, while, simultaneously, the volatile oils and resins of the coal re-appear as that black compound called tar. There are mechanical arrangements for allowing these impurities to settle in a particular receiver, which of course requires to be periodically emptied. Its very stinking contents are of commercial value, and the arrangement of the City Gas Company is, on certain days of the week, to discharge this refuse of their establishment into a tank barge, by which it is conveyed beyond your jurisdiction. The loading of this barge always occurs in the daytime, at or about the time of high water.

"The second stage of gas purification is to separate by the action of lime all that has remained in it of sulphuretted hydrogen. In the City gasworks, where use is made of the apparatus known as the wet-lime purifier, the gas bubbles through great churning tubs of milk of lime, and leaves in them its sulphuretted hydrogen, combined into sulphuret of calcium. These constitute a very bulky refuse, and, as they are of no commercial value, the company discharges them into the Thames by a pipe which runs from their establishment to near the middle of the river. I am assured by the servants of the company that this evacuation never takes place otherwise than late at night, and at such periods of the tide as may enable the refuse immediately to mingle with large volumes of water.

"Theoretically speaking, this discharge might, perhaps, be inoffensive, for, assuming the action of the condenser to have been complete, and the lime of the purifier to have been in chemical excess, the refuse referred to would consist of an inodorous slush of insoluble proto-sulphuret of calcium, not liable to rapid decomposition in the river water. But this is practically not the case. The blue billy (as it is called) contains many bituminous matters that have escaped precipitation in the condenser, and it is liable (from deficient action of the purifier) to present free sulphuretted hydrogen, or to contain a soluble and fetid bi-sulphuret of calcium instead of the insoluble and inoffensive proto-sulphuret. I, therefore, cannot doubt that its discharge into the Thames must be regarded in the light of a common nuisance which it lies within your functions to suppress.

"To this, however, I must add that, in consequence of the legal proceedings already referred to (judgment meanwhile remaining in abeyance) the gas company has pledged itself to an abatement of the nuisance. In fulfilment of this pledge they have now nearly completed, on a very large scale, and at an expense, as they allege, of many thousand pounds, certain new works which will substitute for the second process I have described to you the use of a dry lime purifier, and, by thus giving a cartable refuse, will enable them entirely to refrain from polluting the river. As the endeavour to effect this reform is now being made in good faith and at great cost, I presume your honourable Court will consider the question of nuisance from the lime purifier one that may stand over for the present.

"With respect to the other stage of the process—the action of the condenser—I am much disposed to believe that it occasions the more obvious nuisance of the two; and I suspect that the loudest complaints I have heard relate to the period when the tank-barge, moored off the

premises of the company, is receiving its freight of tar and ammoniacal liquor, collected from the receivers of the condensing apparatus; for in these ingredients are concentrated the well known odours of gasworks—a very complex pungency, that may be analyzed into something of rotten eggs, something of waterproofing, and something of ill-conditioned urinals.

"I think it would be reasonable to require that this process should be so amended as to occasion no spread of stink in its vicinity; and, without pretending to dictate the terms of any such amendment, I would suggest as an illustration of what I mean that the receptacles of this refuse, instead of being fixed in barges, might be moveable vessels capable of being loaded within the building, where the offensive process could be conducted under cover of some hood ventilation into the furnaces of the establishment.

"In addition to those sources of nuisance to which I have adverted, it seems probable that in various acts of shifting and changing the retorts the general atmosphere of the place may be considerably impregnated with the odours complained of. Under existing circumstances it is difficult to judge whether this evil prevails to any serious extent; but if there should continue any complaints referrible to the manufacture of gas when divested of the two principal nuisances now arising in the disposal of its refuse, it may become necessary to revert to this question with a view to require some inodorous ventilation of the building."

INSTITUTE BOOK ORDERS.

OCTOBER ACCOUNT.

	Full Price. £	s.	d.	Red. Price. £	s.	d.
Banbury, Mechanics' Institution	14	2	10	11	1	0
Brighton, Railway Literary and Scientific Institution	1	16	0	1	8	5
Chester, Mechanics' Institution	12	5	3	9	10	1
Derby, Railway Literary Institution	19	12	2	14	12	1½
Downham Market, Mechanics' Institute	1	19	6	1	11	6
East Retford, Literary and Scientific Institution	0	15	0	0	11	7
Hants and Wilts Educational Society	7	4	0	5	7	2
Hastings, Mechanics' Institution	13	13	9	10	6	2
High Green, Mechanics' Institute	4	7	8	3	6	5
Holmfirth, Mechanics' Institution	0	17	6	0	14	1
Horncastle, Mechanics' Institution	0	12	0	0	9	8
Huddersfield, Philosophical Society	2	11	6	1	19	7
London, Bank of England Library and Literary Association	5	17	0	4	10	2¼
Longton, Athenæum and Mechanics' Institution	8	6	0	6	14	11
Pembroke Dock, Mechanics' Institute	3	12	4	2	18	7
Sevenoaks, Literary Institution	0	17	10	0	15	0
Shaftesbury, Literary Institution	22	5	4½	15	18	6
Stamford, Institution	1	7	1½	1	0	2
Westerham, Literary Institute	4	0	11	3	5	8
Wolverhampton, Athenæum	16	12	11	12	0	3
	£142	16	8	£108	1	1

Being a saving of £34 15s. 7d., or an average discount of 25 per cent.

Home Correspondence.

SEWAGE THE SERVANTS' PERQUISITE.

SIR,—Two facts of great public importance have been established in a very convincing, if not wholly satisfactory manner. One fact is, that the animal exuviæ constantly collecting where human beings congregate are very prejudicial to human health. The other fact is, that such exuviæ are very conducive to the healthy growth of vegetables. But vegetables do not grow where men congregate, and the problem we have to solve is, how to transport the exuviæ to the vegetable locality in an economic and profitable mode, without creating a nuisance. If this could be made a third fact, a large amount of human evil would disappear.

In London the sewage of our city is washed into the Thames in part, and stagnant filth is collected in all quarters, to be transported away at intervals, by cart, boat, and rail. In most towns and cities possessing a river, the water course being the natural, is also considered the best artificial, drain. On the sea's margin the sewage of the large watering-places is gradually permeating the sand and shingle, and converting them into receptacles resembling the black ditches of country villages and undrained towns. Sandgate, just decimated by cholera, is a sample of this. Marseilles, on the Mediterranean, is gradually filling up its harbour with filth of all kinds, which the tideless sea cannot wash away, and the time will probably arrive when some huge plague will destroy the population, unless they take warning and use means to destroy the nuisance. Cadiz and other Spanish ports are in the same condition. Farther west, bordering on the same sea, and with natural conditions the same as Marseilles, we find the town of Nice free from such nuisances. The exuviæ there are rendered profitable for the purposes of horticulture and agriculture, and no portion is wasted. This is not done by public companies, but by private individuals, and so carefully, that a proprietor letting his house stipulates with his tenant for the same care, and instances are known of suits at law to recover damages for loss of exuviæ sustained by families travelling during the period of the lease.

The difficulty of the sewage nuisance increasing in our bathing towns has given rise to the practice of running the sewer pipes below high-water mark. This does not wholly cure the evil. The mouth of the sewer is apt to be stopped by sand and shingle at times, and at other times by water, which, drives the gases up the drains. The filth deposited in the Thames, in front of the buildings, has now become so intolerable, that it is proposed to carry down the sewage to a lower level, and discharge it in a body on the Kent and Essex marshes; but this is only removing the locality of the mischief—creating the nuisance in another quarter—making pestilential marshes for the transport of miasma through the air in any direction the wind may blow, and making the east wind more mischievous than ever.

In Paris the exuviæ are largely converted into inodorous substances. In England the same process is pursued by the use of lime, peat charcoal, and other materials, and it is said with success. It is therefore proposed to get up large companies to manufacture a species of home-grown guano at a cheap rate. If this can be done it is doubtless desirable, but a far better and easier process would be to devise means for enabling the servants of a house to turn it to their own individual profit. If the article produced were actual guano as known in the market, and of sure and certain sale, there is no doubt that every ounce would be preserved as carefully as kitchen waste grease.

This is a question for the chemist as well as the mechanist, how to destroy the noxious properties of the exuviæ in accessible receptacles without spoiling the material for the use of agriculturists. If lime or peat, or some other material to be procured at a cheap rate, can be

made a certain recipient and disinfectant, it will be possible to build houses in which surface drainage only will be required, with the assurance that the actual money interest of a given number of surplus pence per week will ensure domestic attention, stimulated as it would be by the regular call of the scavenger. Common coal-dust is a partial deodoriser. Might it not prove a valuable basis to unite with other chemical ingredients. If this can be done economically on the continent, it may be done here. Our waterclosets are contrivances to keep our houses clean, and pollute the river and other exits of sewers. With the disinfectant system there would be pollution nowhere. But the cesspool for the day or for the week should be a glazed structure, accessible at all times from the exterior of the dwelling. The late James Smith, of Deanston, actually practised this daily removal in large cotton-mills, without trouble or nuisance. There is surely less difficulty in carrying away by a weekly operation the inodorous exuviæ of a dwelling, than there is in running the daily increment into the river.

There was a time when the Commissioners of Sewers strenuously resisted all communications between privies and water-closets and their large brick tubes. It appeared absurd, but it was not so devoid of reason when we consider that the process was only a gradual pollution of the river. Parisian proprietors of houses also resisted the introduction of water-closets, on account of the increased expense of carting away the contents of their cesspools. But if the liquids can be converted into pure water, as Mr. Lipscombe, Lord Palmerston, and others, will tell us they can—" dirt being only something out of place "—there is no reason why such water should not go direct to the river, leaving behind them the chemical ingredients that are valuable enough to retain.

I trust that the chemists of the Society of Arts will discuss this question in your pages, and show us why it cannot be done, if so they opine, and how it can best be done, if they agree with me. But it must be a real and effective operation, and not a pastime. It would be a great triumph for them could they enable us to dispense with the enormous outlay and inconvenience of underground sewers. Mr. Chester once described, at a meeting, how rills of artifical pure water were procured from sewers on the Croydon line. Perhaps he will further, as the phrase goes, " ventilate " the question.

One great facility in all matters connected with drains would be to prohibit their burial beneath the surface of the ground. They should be as accessible as sinks or dustholes.

I am, sir,
Your constant reader,
COMMON SENSE.

TOWN SEWAGE.

SIR,—I have waited a week in order to see whether any manufacturer or purchaser of manure concentrated from town sewage, would say more than Mr. Wilson has in favour of Mr. Wicksteed's scheme for laying out a million sterling of public money in a manufactory of London sewage.

With Mr. Wilson I concur, in the urgent necessity that exists for doing away with open sewers and cesspools, and conveying our town sewage to distances where it can do no harm; and I think that those who have sufficient intelligence to see the grave evils of a state of things which systematically breeds fevers and pestilence, permanent cripples and paupers, ought to agitate and labour continually for the removal of town filth on a complete and systematic plan.

But I protest against bribing localities to undertake sanitary works by false promises of profits, and I protest against public bodies, like parishes, entering into manufacturing speculations. It was altogether premature to call upon Mr. Wicksteed to make a report upon the value of his own invention before it had been satisfactorily tried. At present, I repeat, no one has succeeded in manufacturing at a profit, on a wholesale scale, a concentrated manure from town sewage which it is worth the while of farmers to buy. All that has been done has consisted in spending a shilling of labour and chemical materials to produce an article worth tenpence. I do not say that this will never be done, but if it should, the manufacture of town sewage will be most properly carried on by private enterprise, with private capital.

Mr. Wilson's active philanthropic character is a sufficient guarantee that he was influenced by the best motives in publishing the paper which called forth my comments; but, nevertheless, it is time that all the nonsense talked on the subject of town sewage be assessed at its real value, and that town populations be taught that if they desire to be healthy, they must pay the necessary expenses without expecting to make a profit of their nuisances.

At the present moment not only are old populations like those of Kennington and Lambeth poisoned by cesspools and sewers, but districts like Sydenham and Forest-hill, formerly the most healthy in England, are becoming saturated with ingredients producing every kind of disease. The owners of house-property are, as a body, blind and deaf to their duties; when they are prepared to raise the funds, our civil engineers know how to do their work.

A heavy cholera or fever fine imposed upon houses and land in every parish where disease appeared would bring absentee landlords to reason.

I hope that Mr. Wilson's suggested discussion on the use of town sewage will be carried out at the Society of Arts this session; and that when it takes place, no *one* individual gentleman will be permitted to occupy the whole evening in reading printed papers and advocating his own peculiar crotchets.

I am, &c.
S. S.

Farmers' Club, Blackfriars, Nov. 7, 1854.

HEAVY ARTILLERY

SIR,—Your talented correspondent, W. Bridges Adams, has opened out a vast and most valuable field of inquiry on this subject, but there are a few points upon which I cannot exactly agree with his views and deductions.

The destruction of heavy ordnance by long-continued firing is notorious, but if recoil were wholly prevented would not the destruction be still more rapid? It is true that by his mode of preventing recoil by means of the flange with ball and socket joint at the muzzle, there would be the advantage of the slight elasticity of the ship's side. It would, however, be a still more perfect mode to continue the present breechings, but with an entirely altered form of the inner end of the gun. That is, to do away with the cascabel, and all other useless ornaments, and to terminate the breech with a broad and heavy flat disk, which might be made to rest against the best buffer known, a series of vulcanised india rubber and iron plates of the same size as the aforesaid disk, a combination which affords the greatest elastic resistance in the smallest space; precisely what is wanted to prevent the too rapid destruction as well of the gun and carriage as of the ship's timbering.

In regard to length of barrel I cannot agree in the opinion, that the same proportion should hold good with a six-inch bore and a quarter-ounce American rifle. In a six-inch gun, thirty-six feet long, the friction of the bullet through such a long pipe would be enormous, more especially if no windage were allowed. In fact, if too long, the expansive force of the gases produced by the explosion of the powder, greatest at the first impact, could have no effect from the moment the velocity of expansion became less than that of the ball; and to such an extent might the length of the bore be increased, that, though still only a fractional part of the range of the shorter gun, the bullet would not even reach the muzzle.

On the subject of length of barrel, I may also remark that formerly, before the modern improvements had taken place in the construction of the ordinary fowling-piece, sportsmen, at any rate abroad, were in the habit of getting a good long-barrel gun, and if upon trial they fully approved of it, they would have the barrel shortened mostly at the muzzle, but sometimes at both ends, and re-stocked, the invariable result being a greater range and truer aim. I am therefore led to believe that the long quarter-ounce American rifle might be shortened without at least losing any of its valuable properties. May it not be possible that the two extreme ends of a barrel cannot be so truely bored as the intermediate central portion?

Windage when in excess is certainly objectionable, but from that part of the bore towards the muzzle where the ball rests upon the cartridge, where there should be a tight fit, the bullet should be perfectly free. The great obstacle to diminished windage is the imperfection of the ball, which, however cleverly cast in turned iron moulds, is still subject to roughness, and is seldom a perfect sphere. I may here allude to a method I became acquainted with in some of the Italian founderies, of producing perfectly smooth and spherical cast-iron shot.

The balls for the Barbary coast are, or were, supplied from Italy. I speak of times when an entire family was carried off by a Barbary corsair in my immediate vicinity, near Leghorn. The Barbary people refuse all shot that are not smooth and spherical, and the expedient adopted to satisfy their very critical examination was this: As soon as the shot was set, but still red-hot, it was shaken out of the iron mould and thrown into a trough that led to a rapid tilt-hammer, the face and anvil of which being a hollow hemisphere, truely turned and polished, of course rather less than the entire globe. A hose with a watering-pot rose brought cold water upon the red-hot ball, while a workman with peculiarly-shaped tongs turned the bullet swiftly round in every direction, and in a very few seconds the shot would become beautifully smooth and truely spherical.

Loading at the breech has been accomplished at various times with guns of all sizes, but never brought into use, owing to the fault of keeping the severed portions of the same size as the entire gun would have been, whereas they would require to be vastly more ponderous in order to gain the same strength.

The only way by which perfect success may, perhaps, be obtained, would be to construct the barrel and breech separately, the latter having two motions, one backwards to release the socket-joint from the barrel, and the other sideways for the convenience of charging. Two advantages of no small moment would result from this arrangement—first, that the barrel would suffer no recoil, and consequently would not deteriorate; and secondly, that each barrel might be furnished with several breeches, so that the shower of bullets from one gun would be almost incessant—a near approach to the American revolver.

I certainly think, with W. Bridges Adams, that compressed air ought to supersede, in some degree, the use of gunpowder, which is so dangerous, expensive, and cumbrous; but there is a strong prejudice among military and naval men in favour of gunpowder. They seem to consider that the fire, smoke, and noise of the gunpowder, go a great way in the defence of a fortress or winning a battle, and will not believe that the same end might be gained by simpler and less-expensive means in a shorter time, without such disagreeable accompaniments. There have been commanders who have boasted of the brilliancy of their defence, as having fired so many thousand shot and shell, without considering that perhaps not more than one in a thousand of their projectiles did any execution.

The condensation of air by means of three or more cylinders, each pumping into the one next to it, is a very simple and economical arrangement, because, though in the aggregate they may be condensing to the extent of fifty or a hundred atmospheres, no one piston is subjected to a greater pressure than the difference between the one before and the one after it; and I do not see why we should not be able to throw a ton of gunpowder at a shot, in bags or globes of double-quilted canvas, with fuse attached, by such or other mechanical means. A few of such projectiles would certainly cause far more devastation than thousands of shot and shell.

By all accounts, the ancients had no difficulty in throwing stones of that weight with their rude balistas and catapultas—nothing more than a carpenter's frame-saw, only on a rather larger scale.

HENRY W. REVELEY.

Parkstone, Nov. 6th.

THE VENTILATION OF EMIGRANT SHIPS.

SIR,—Observing that No. 71 of the Desiderata announced by the Council of the Society of Arts, is "For Improvements in the Ventilation of Emigrant Ships," and conceiving that a statement on that subject of much that has already been done might facilitate further improvements in the ventilation of all navigable vessels, I venture to communicate a short account of forgone proceedings in this matter, and to annex what appears from them to be the main considerations to be kept in view.

It would seem that attention was first drawn to the ventilation of ships by Dr. Hales, about a century ago, and that he invented ventilators, which were ordered for general use in his Majesty's fleet in, or soon after, the year 1756; but no provision seems to have been devised for the effectual ventilation of the several compartments of a ship. The next step was intended to have been taken by Sir Samuel Bentham by introducing a double set of ventilating trunks in his experimental vessel of 1795, when, on account of the many other novelties exhibited in those vessels, and of the unexampled space afforded in them for their crews, this projected ventilation was abandoned for the time. In January, 1805, he acquainted the Admiralty that there were already various contrivances, by means of which, and with due attention, the ventilation of ships might be effected. Still, seeing that this salutary measure was neglected, he caused Dr. Hales' work on ventilation to be procured for the use of the Navy Board, feeling, as he said, "persuaded that if any doubts remained of the good effects to be produced by ventilation the perusal of that work could not fail of doing awy with them."

In the year 1811 a proposal for the ventilation of parts of her Majesty's ship *Inconstant* was referred to him; on this occasion he presented a minute to the Navy Board,* from which the following extracts may be useful. He said, "I have long been convinced of the great importance to the preservation of ships themselves, as well as to the health of seamen, that some means should be provided for the due ventilation of ships. . . . The most essential point to be attained seems the disposing those on whom the use of them (the means of ventilation) depends, to bestow that attention to the subject which is indispensable to their efficacy." He goes on to say, "the mode which seems best adapted to answer the purpose effectually is that first proposed by Dr. Hales, namely, *the extraction of the foul air* by means of a machine which he calls a ventilator, which really is a kind of wooden air-pump, but of very simple construction, easy of repair, and requiring *little power to work it*. . . . Such ventilators, with very little alteration, are now used under the name of White's Extractors. . . . It appears, however, that his means as far as regards the extraction of foul air would be found sufficient, if the use of them were persevered in; yet that no contrivance has hitherto been introduced adequate to the easy and regular introduction of fresh air to supply the place of that which has been ex-

* See Naval Papers, No. 6.

tracted; so that, in some cases, while the foul air has been extracted from one part of a ship, still worse air has been drawn in from other parts." The general proceeds to say that, "in the construction of new ships, or when *the repairs to others admit of it*, it seems desirable that two sets of pipes or trunks should be laid throughout, having apertures opening into every close compartment; one of these sets of pipes being those subservient to the extraction of the foul air, to lead to a fixed ventilator placed at the end of the ship where room for it can best be spared; the main pipe of the other set of pipes for the conveyance of fresh air into the several compartments, to be brought up on the quarterdeck or forecastle, where most out of the way and clear of foul air. . . . For the purpose of ventilating ships lying in ordinary, when there is no labour to be spared for working a ventilator, one hood may be fixed to the supply pipe, and turned *to* the wind . . . . , and another hood be fixed to the end of the extraction pipe, so as that being turned *from* the wind, the action of it may facilitate the exit of foul air: which hoods, as well as all other apertures, should be formed *funnel*-shaped, the advantages of which form of opening for increasing the velocity of the entrance and exit of all fluids has been fully established by the experiments of Venturi and Vince. This mode of ventilation seems, however, far from eligible for ships in actual service, since in cold and windy weather the crew would be liable to be incommoded by an excess of cold air, whilst in hot and calm weather, when ventilation is most necessary, the change of air obtained by these hooded pipes would be very inconsiderable."

The "Minute" continues to suggest arrangements in existing ships, which do not admit of ventilating all of their compartments, and concludes with the observation, that, "however perfectly it (the apparatus) may be contrived, with a view either to the health of the crew, or to the preservation of the ship itself, as well as of the stores contained in it, the efficacy of the apparatus will still depend upon its being worked almost without intermission. . . I would observe that it would be easy to fix such an index, or tell-tale, to the valve of a ventilator as would show at any time the number of strokes it had made."

On the 15th Dec., 1848, Dr. Arnott reported to the Board of Health, "On the Principles of Ship Ventilation, and on a plan for Ship Ventilation by means of the Pump."* The doctor commences his report by general observations as to the need of a supply of fresh air, and afterwards speaks of Dr. Hales' ventilator, saying, that "some old naval men, then in office, who disliked novelty, and did not understand the subject, represented that the advantages of the pumps were not a compensation for the great labour required in working them." He says that matters were in this state some years ago, when he devised the ventilating pump with *curtain valves;* but he does not mention White's Extractors. It would appear to me that the disuse of ventilators in the Royal Navy arose from the dislike of seafaring persons to novelties of all kinds, and their reckless disregard of sanitary innovations, rather than from any amount of labour required to work Hales' ventilator; for, although much of my time for sixteen years was passed in naval arsenals, yet I never heard the labour required to work the ventilators urged as an objection to their use. Dr. Arnott's pumps with "curtain valves" seem, however, to be a considerable improvement on ventilating pumps, a complete vacuum not being requisite. Dr. Arnott also recommends two sets of pipes, one of them for the conveyance away of foul air, the other for the supply of fresh air; but, as he says, a single tube of fit size, divided by a longitudinal partition into two channels, is a convenient form. It would appear that by this arrangement foul air might often mix itself with the fresh air, and thus the apparatus be rendered much less efficacious than where the entrance tube should be far distant from that for the exit for foul air.

* See General Board of Health's "Report on Quarantine," p. 144.

The important advantages of due ventilation were exemplified in the *Anson* transport ship.* The idea of the pumps employed was furnished by Dr. Neil Arnott. An extract from the log book of Dr. Andrew Miller, the Surgeon-Superintendent of the vessel, says that about 250 convicts were confined in the orlop deck. That "two boys can with ease work a pump for two hours, and are then fit for any other duty." That such a pump can be made for about thirty shillings, and that four such pumps were fitted in the *Anson.*

Having heard, about three years ago, of the severe sufferings of emigrants to Australia during warm close weather, for want of sufficient ventilation, I suggested to the Reverend Mr. Queckett, the introduction of ventilating pumps on board of emigrant ships; but he considered the means adopted for this purpose in vessels fitted under his direction were quite sufficient. They may be so in this climate, and in breezy weather; but from what has transpired it does not appear to be the case in calm or in hot weather. It has lately been proposed to place a six-horse steam-engine on board ship for the sole purpose of working ventilating pumps; an extravagant employment, it would seem, of steam-power in emigrant ships, since passengers weary for want of occupation, and every one in turns, might find it in working the pumps. It might indeed be necessary at first to cause passengers to enter into suitable agreements for taking spells at this employment, but this occasional labour would doubtless contribute much to the good conduct of emigrants, seeing that the forced idleness to which emigrants are subjected during the passage to Australia is a chief cause of insubordination to needful regulations. Much the same may be affirmed in regard to vessels of war, for it is not every day the crew are in action with an enemy. Complaints have been made that the crews or passengers of vessels, frequently obstruct the entrance of fresh air by tying up wind-sails, or by stopping up air-pipes; a practice totally subversive of due ventilation, but which is caused by unhealthy and disagreeable currents of cold air which, according to customary arrangements, delivers fresh air in large volumes by a few openings only.

It may be collected from the above that the chief desiderata in ventilating emigrant ships are as follows:—

1. That there should be two distinct sets of pipes or trunks, the one set for the extraction of foul air, the other set to supply fresh air.

2. That these pipes should have communication with every compartment of the vessel.

3. That the external apertures of the pipes should be at a considerable distance from each other.

4. These apertures should be funnel-shaped.

5. Attached to the foul-air set of pipes should be some kind of air pump for the extraction of foul air, and as the human adult consumes above 231 cubic feet of air per hour, the extracting pump or pumps should be capable of extracting that quantity of air per hour, multiplied by the number of adults to be supplied with respirable air; and that for the due ventilation of store rooms a sufficiency of extracting power be furnished according to the nature of the stores to be preserved. That these extractors should be of simple construction, little liable to damage under moderate care, easily repaired, and of little first cost.

6. That the fresh air pipes in the habitable parts of a ship should be so arranged as not to inconvenience passengers or crew by throwing blasts upon them. On this account, the pipes should be placed in parts where the air from them would be thrown upon a wall or ceiling, that the apertures from the pipes should be small, and so graduated as that the air might be distributed equally to all parts of the compartment.

* See the Report of the Board of Health on Quarantine, p. 152.

For example this may be effected by means of a continuous slit in the pipe, the slit being very narrow where the air enters from without, but becoming larger and larger the farther the pipe advances, or the air might be admitted over a false ceiling, either punctured less or more, according to distance, or even by having small openings between the boards. A false ceiling of perforated zinc would answer the double purpose of an air-distributor and of a protection from the communication of fire from candles or lamps.

It has been surmised that in case of fire on board ship, pipes for ventilation would greatly increase the danger by their ready supply of air. On this account covers for both entrance and exit pipes should be provided, kept constantly at hand, and some particular person on deck should be charged with the duty of immediately closing the pipes should fire be apprehended.

In many vessels it might be inconvenient to elevate pipes much above deck, yet this seems desirable for the exclusion of water or spray; attention should therefore be directed to this subject, particularly as to whether any of the usual gear of a ship might serve the purpose of air-channels also.

In cold weather, desirable as it would be to warm the air brought in for ventilation, yet this does not seem to have been attempted: a further consideration might be the application of waste heat to this purpose, as for instance, in steamers by causing metallic air-pipes to pass through the engine room, and in other passenger vessels the surrounding the cooking apparatus with a case through which the fresh air might pass. A considerable degree of heat seems by no means desirable, but solely to so temper cold air as that it should be a few degrees above the freezing point.

The above suggestions are by no means presented as complete; but they may serve to elicit observations of great importance, and it may be hoped that correspondents of the *Journal of the Society of Arts* will favour it with their ideas on this important subject,—important not only in respect to emigrant ships, but to all passenger vessels, sea-faring men in general, and to the crews of her Majesty's fleets, on which the safety and honour of the nation so materially depends.

M. S. BENTHAM.

Hampstead, 31st Oct., 1834.

THE LONDON GAZETTE.

SIR,—Allow me to suggest to the Council of the Society of Arts the desirableness, especially just now, of having on the table of the reading-room of each Literary and Mechanics' Institution a copy of the *London Gazette*. This is at all times an interesting public document, but at the present moment particularly so, as, although most of the intelligence of public interest contained therein finds its way into the papers, yet there are very many who, having friends or relatives in the Crimea, would like to see in the official statement itself, the account of the successes or reverses attendant upon our proceedings in the East. To us, situated as we are, it would possess more than ordinary interest. The expense of the *Gazette* is, I believe, rather great to purchasers, varying from time to time, according to the amount of printed matter, and therefore, with the lengthened dispatches we have had, and are likely to have, it would amount to a sum which most Institutions can ill spare from their limited income. Permit me therefore to call the attention of your Council and the representatives of the various Institutions in Union to this matter.

I remain, sir, yours truly,
PRIOR PURVIS, M.D., Lond.,
Representative of the Greenwich Institution.

6, Lansdowne Place, Blackheath, November 7th, 1854.

P.S. I think the present Government would very readily yield to this request, if assured that the gift would really be of interest, and duly appreciated.

Proceedings of Institutions.

CHICHESTER.—On Wednesday evening, the 4th ult., the members of the Literary Society and Mechanics' Institute held their annual meeting in the lecture-room, when there was a tolerably numerous attendance. The chair was filled by the Rev. J. Fullagar, senior vice-president. The report of the retiring committee showed an increase of members on the year of 34, making a total of 401, from which it may be inferred that the Institution possesses a strong hold upon public estimation. From the financial statement it appeared that the receipts for the year amounted to £242 4s. 4d., and the expenditure to £267 9s. 7d., exhibiting a balance due to the treasurer of £25 5s. 3d., of which the sum of £10 was for new cases just fitted up in the museum. There was also an item of considerable amount for poor's-rates, an imposition which has only been withdrawn upon condition that the committee of the Society surrender their right of occasionally letting the lecture-room, from which a small revenue accrued to the funds. This narrow interpretation of the legislative enactment, professing to relieve Literary Societies and Mechanics' Institutions from the burden of local rates and taxes, at a period when public bodies rival each other in their zeal for the encouragement of Institutions of this class, does not indicate any commendable amount of intellectual sympathies on the part of the parochial authorities of this place. Numerous valuable and important additions have been made to the museum, including a complete collection of British shells, contributed by H. W. Freeland, Esq. The report, adopting a remark of Professor Tennant's, when visiting this Institution, observes, "that this is one of the best arranged and best managed provincial museums in the kingdom." The number of visitors during the past year exceeded 1,350 persons. The library has been increased to an extent commensurate with the means at the disposal of the committee, but the numerous claims on the funds have prevented the purchase of many works that would have much interested and benefitted the Society. On the appointment of officers for the ensuing year, his Grace the Duke of Richmond was re-elected president; the Rev. J. Fullagar, Dr. Tyacke, B. Adams, and W. Gruggen, Esqs., vice-presidents; H. W. Freeland Esq., representative to the Society of Arts; Mr. G. Paull, treasurer; Mr. T. Pescod, curator of apparatus; Mr. J. Gauntlett, secretary; Dr. Gruggen and Mr. Dudden, auditors. The following gentlemen were elected to serve on the committee—Messrs. Allen, W. Arnell, Barnard, Dale, W. W. Dendy, W. Duke, E. Fuller, C. Hurlstone, G. Irving, E. W. Johnston, C. S. Jones, Molesworth, Tullinger, Sawyer, Seamen, Spring, Underton, and F. Waller. Votes of thanks to the gratuitous lecturers, to Mr. Gauntlett, the secretary, and to the Rev. J. Fullagar, as chairman, closed the proceedings. On Wednesday evening, the 11th ult., the opening lecture of the session was delivered, before a numerous assembly of the members and supporters of the Institution, by Hugo Reid, Esq., on "The Life and Inventions of James Watt, embracing a popular sketch of the Steam Engine." Mr. Reid's efforts were not attended by any great amount of success, much disappointment being felt at the purely rudimentary character of the discourse, and at the absence of experiments and working models in illustration of his remarks.

CLAPHAM.—The lecture session at the Literary and Scientific Institution was inaugurated on Friday evening, October 20th, by Mr. Edward Copping, who gave on that occasion his new and highly-popular literary entertainment, entitled "London Lodgings and Lodgers." The chair was occupied by F. B. Garty, Esq., vice president.

SHREWSBURY.—On Monday and Tuesday, the 30th and 31st ult., Mr. Henry Nicholls read Shakspeare's tragedy of "Julius Cæsar," and Sir E. B. Lytton's play of the "Lady of Lyons," to the members of the Literary and Scientific Institution, at the Lion Assembly Rooms. Mr. Nicholls

who has been annually engaged by this Society from its commencement, was listened to with marked interest and admiration on both occasions, by large and highly respectable audiences. At the close of the second evening's proceedings, an announcement was made by the secretary, that Mr. Nicholls had kindly volunteered his gratuitous services in aid of the Patriotic fund. Thursday evening, Nov. 2nd., was fixed upon for the occasion, when Mr. Nicholls read the "Merchant of Venice." As a reading, this play was thoroughly successful, and elicited unanimous and prolonged applause at its conclusion. W. Akerman, Esq., editor of Eddowe's *Shrewsbury Journal*, then rose to propose the thanks of the meeting to Mr. Nicholls, for the high gratification which he had afforded them during his engagement in Shrewsbury, as well as for his liberality in rendering his gratuitous services in aid of the Patriotic fund. After payment of expenses, including hire of assembly room, printing, &c., upwards of five pounds remains to hand over to the fund.

To Correspondents.

*** Members desirous of completing sets of the Journal are particularly requested to apply for missing numbers speedily. Of some numbers very few copies remain on hand.

MEETINGS FOR THE ENSUING WEEK.

MON. Geographical, 8½ (at United Service Museum)—Dr. Rae and others, "On the late Arctic Discoveries."
TUES. Syro-Egyptian, 7½.—1. Mr. Sharpe, "On an Egyptian Slab, bearing the name of Hephæstion and Alexander the Great. 2. Dr. Abel, "On the Coptic language."
Civil Engineers, 8.
WED. Society of Arts, 8.—Chairman's Address.
Geological, 8.—1. Mr. D. Sharp, "On Mont Blanc; its Geological Structure, and the Cleavage of the Rocks in the vicinity." 2. Capt. L. Brickenden, "On Traces of Glacial Scratchings on the Surface of the Rock of Dumbarton." 3. Capt. L. Brickenden, "On a Pterichthys from the Old Red of Morayshire."
THURS. Antiquaries, 8.
SAT. Medical, 8.

PATENT LAW AMENDMENT ACT, 1852.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[*From Gazette, Nov. 3rd*, 1854.]

Dated 30th August, 1854.
1899. L. P. Lehugeur and M. Uttinger, Paris—Machinery for printing fabrics.

Dated 8th September, 1854.
1960. T. Pettijean, 45, Upper John-street, Fitzroy-square—Recutting faces of files.

Dated 26th September, 1854.
2072. T. Griffiths, Madeley—Pump.

Dated 30th September, 1854.
2097. W. Wilkinson, Nottingham—Looped pile and cut pile fabrics.
2099. W. Tucker, Old Brompton—Preventing escape of fuliginous smoke from shafts and flues.
2101. T. Collins, Gayton—Bricks and tiles.
2103. M. Poole, Avenue-road—Condensers. (A communication.)

Dated 2nd October, 1854.
2105. A. E. L. Bellford, 16, Castle street, Holborn—Suspended purchases. (A communication)
2107. G. Wall, Manchester—Railway tickets.
2109. T. Sherriff, Glasgow—Moulding metals.
2111. F. Durand, Paris—Looms.
2113. N. Bennett, 7, Furnival's-inn—Substitute for scaffolding. (A communication.)
2115. C. Hill, Chippenham—Pulp.

Dated 3rd October, 1854.
2117. J. Hammond, 9, Brunswick-street, Stamford-street—Suspension reading desk.
2119. W. Blythe, Oswaldtwistle, and E. Kopp, Accrington—Soda ash and sulphuric acid.
2121. A. V. Newton, 66, Chancery-lane—Motive-power engines. (A communication.)
2123. W. McNaught, Rochdale—Slide valves.
2125. W. Townend, Harden Bingley—Combing wools.

Dated 4th October, 1854.
2129. F. S. Thomas, 17, Cornhill—Motive power.
2131. W. P. Gaulton, Cragworks, Macclesfield—Railway breaks.
2133. A. A. J. Legentil, Arras—Pumps.
2135. T. Prosser, New York—Manufacture of hollow-closed vessels.
2137. T. W. Rammell, Trafalgar-square—Furnaces.

Dated 5th October, 1854.
2139. T. E. Moore, 3, Great Titchfield-street—Machinery for cuttings in metals.
2141. E. O. Tindall, Scarborough—Mangles and wringing machines.
2143. G. Collier, Halifax—Carpets.
2145. T. Bennett, Woodbridge-street, Clerkenwell—Gold, silver, and metal leaf.
2147. J. M. Dunlop, Manchester—Spinning machinery.

Dated 6th October, 1854.
2151. P. Kerr, Paisley—Threads or yarns.

Dated 7th October, 1854.
2155. G. T. Selby, Smethwick—Furnaces.
2157. T. Roberts and J. Dale, Manchester—Extracts from dye woods.
2159. R. Maynard, Whittlesford—Threshing grain.

Dated 9th October, 1854.
2161. J. Shanks, St. Helen's—Sulphuric acid. (A communication.)

Dated 10th October, 1854.
2163. N. Prothéry, Lyons—Lace.
2165. V. W. Hammerich, Altona—Buoyant mattress.
2169. J. Kershaw, Brixton—Wrought-iron railway wheels.
2171. W. Chubb, Clifton—Ships' masts, spars, &c.

Dated 16th October, 1854.
2208. J. Bonnall, Grantham—Apparatus for holding oil for lubricating purposes.
2210. E. Bernot, Paris—File-cutting machine.
2212. J. H. Johnson, 47, Lincoln's-inn-fields—Discovering leakage of gas. (A communication.)
2214. L. J. Wetherell, Compton-street, Clerkenwell, and A. J. Hoffstaedt, Albion-place—Pump.

Dated 17th October, 1854.
2218. L. Cornides, 4 Trafalgar-square—Amalgamating gold and silver in pulverized ores.
2220. A. Veal, Oxford—Boots.
2222. J. Dockray and J. Dawson, Leeds—Woollen cloth.
2224. R. Green, 12 Sydney street, Brompton—Propelling vessels.

Dated 18th October, 1854.
2226. A. E. L. Bellford, 16, Castle-street, Holborn—Breech-loading firearms. (A communication.)
2228. E. Gessner, Aue, Saxony—Gig mills.
2230. J. Mason and W. Robertson, Rochdale—Spinning machinery.
2232. M. Wheeler, Newton-street, Holborn—Consuming smoke.

Dated 19th October, 1854.
2234. R. W. Winfield, Birmingham—Tubes or rods used in metallic furniture.
2238. J. Platt, Oldham—Bricks.
2240. Commander T. Higgins, R.N., Oldham—Ventilation of ships and mines.

Dated 20th October, 1854.
2242. L. A. Chenu and F. F. Pillias, Fontainbleau—Preserving mineral substances.

Dated 21st October, 1854.
2246. W. J. Smith, Stretford—Buttons.
2248. J. Jamieson, Oldham—Steam-engines.
2250. B. J. Heywood, Dalkey, Dublin—Apparatus for affixing postage labels.

Dated 23rd October, 1854.
2252. E. Abbell, Lambeth—Instrument to assist the hand in writing.
2254. G. Savage, Adderbury—Singeing lamp.
2258. J. Penn, Greenwich—Pistons, slide valves, and stuffing boxes.
2260. E. H. Marié, Paris—Spinning machinery.

Dated 24th October, 1854.
2262. F. J. Bouwens, Mechlin—Rotary engine.
2266. J. Hopkinson, jun., Huddersfield—Steam-engine boilers and safety valves.

Dated 25th October, 1854.
2268. J. Rickhuss and C. Toft, Worcester—Parian, porcelain, china and earthenware.
2270. W. Henderson, Cannon-street—Ores and alloys.
2272. R. Roberts, Manchester—Spinning machinery.
2274. R. H. Hughes, 95, Hatton-garden—Motive power
2276. F. Lambert, Paris—Compounds for cosmetics.
2278. L. V. Helen, Brussels—Straw paper.

Dated 26th October, 1854.
2280. W. G. Craig, Gorton, near Manchester—Consuming smoke.
2282. J. Healey, J. Foster, and J. Lowe, Bolton-le-Moors—Metal-working machinery.
2284. C. H. Olivier, 37 Finsbury-square—Drying apparatus. (A communication.)
2286. P. A. le Comte de Fontaine Moreau, 4 South-street, Finsbury—Transferring coloured pictures, portraits, and engravings. (A communication.)
2288. J. Dudgeon, 151 Fenchurch-street—Rendering ships and batteries shotproof.

INVENTION WITH COMPLETE SPECIFICATION FILED.
2312. J. C. Hall, Monkwearmouth—Windlass, 31st October, 18*4.

WEEKLY LIST OF PATENTS SEALED.

Sealed November 3rd, 1854.
1018. Henry Gregory Drewe, Paddington—Improvements in obtaining metals from ores.

1023. John Hartley Higginbottom, Ashby-de-la-Zouch—Improvements in the valves and apparatus connected with water-closets, certain portions of which are applicable as cocks or valves for other purposes.

1024. Julian Bernard, Club Chambers, Regent-street—Improvements in machinery or apparatus for sewing, stitching, or ornamenting.

1032. Charles Benjamin Normand, Havre—Improved machinery for sawing wood.

1042. Rees Reece, Athy—Smelting of iron by means of turf or peat simultaneously with the combustion of the peat and collection of the products therefrom.

1078. Capt. Henry Young Darracott Scott, R.E., Queen's-terrace, Woolwich—Improved cement, applicable as a plaster or for moulding purposes.

1080. Louis François Saugrin, Paris—Improvements in apparatus for the production of stereoscopic and photographic pictures.

1106. Thomas Chambers Hine, Nottingham—New method of applying glass in the ornamentation of chandeliers and other fittings required for gas, candle, oil, or other artificial light.

1604. John Knight, Birmingham, and James Stubbs, Olbury—Improvements in the manufacture of bricks, tiles, pipes, and such other articles as are, or may be made of clay, which improvement or improvements may also be applied to the manufacture of artificial fuel, and to other mixing and tempering processes.

1628. Hugues Champonnois, Chaumont, and Jean Baptiste Ba... lier, Dijon—Improvements in the manner of treating b... root and all other sugary and feculent vegetables.

1760. John Gibson, Paddington—Improvements in the manufacture of railway wheels.

Sealed November 7th, 1854.

1046. Joseph Shepherd, Manchester—Improvements in compound steam engines.

1050. John Cundy, Carrington, Basford—Improved reflector globe or shade for gas, candle, oil, and other artificial light.

1058. Christopher Nugent Nixon, Ramsgate—Improved modes of attaching rudders to floating vessels.

1059. Daniel Campbell and James Barlow, Accrington—Improvements in looms for weaving.

1073. Jérome André Drieu, Patricroft—Improvements in machinery or apparatus for cutting fustains, velveteens, and other similar fabrics to produce a piled surface.

1092. James Philip Baker, Chillington Colliery, Wolverhampton—Improvements in the construction of railway and other bridges, and in the method of lifting the same after sinking.

1096. Henry Cornforth, Birmingham—Improvement or improvements in shaping and ornamenting metals.

1098. Alfred Vincent Newton, 66 Chancery lane—Improved construction of tenon and of machinery for forming the same, applicable to the manufacture of boxes and other analogous uses.

1118. Johann August Haberhauffe, Grossmuhlingen, Anhalt—Improvements in fire-arms and projectile weapons.

1120. Peter Armand le Comte de Fontaine Moreau, 4, South-street, Finsbury—Improvements in connecting the permanent rails of railways.

1130. John Crossley, Newton Moor, near Hyde, and William Crossley, Failsworth—Improvements in Jacquard machines.

1133. Berkeley William Fase, Charles-street, Soho-square—Improved construction of brooch for fastening dresses.

1134. William England Dudley—Improvements in pneumatic and hydraulic wheels and fans.

1146. William White, Cheapside—Improvements in hats and in hat blocks.

1149. Joseph Kuczynski, 46, Rue de Rivoli, Paris—Improvements in preparing baryta and its salts.

1404. Alexander Bain, 4, Queen's-row, Grove-lane, Camberwell—Improvements in fire-arms and the apparatus connected therewith.

1436. Nathan Thompson, junior, New York—Improvements in regulating the supply of steam for steam-boilers.

1558. Thomas Wright, 9, George-yard, Lombard-street—Improvements in the permanent way of railways.

1561. William Hunt, Tipton—Improvements in utilizing certain compounds produced in the process of galvanizing iron, and in the application of the same and similar compounds to certain useful purposes.

1590. John Sudbury, Halsted, and Samuel Wright, Clare—Improvements in taps and valves, and in the method of working them for the purpose of regulating the passage of fluids.

1685. Henry Green, Liverpool—Improved apparatus applicable to the hanging of doors, gates, and windows, and for closing or holding open the same when required.

1703. Paul Garavaglia de Soresina, Bedford-row—Improvements in treating flax and hemp.

1769. Joseph Moore, Manchester, Samuel Beswick, Failsworth, and Benjamin Wilson, Woodhouses—Improvements in the manufacture of piled goods or fabrics.

1817. Edward Lund, Manchester—Improvements in cocks, valves, water-plugs, and flexible joints.

1819. William Johnson, 47, Lincoln's-inn Fields—Improvements in moulding or shaping articles of vulcanised caoutchoc.

1820. William Johnson, 47, Lincoln's-inn Fields—Improvements in the manufacture of hat bodies.

1832. Robert Brisco, Low Mill House, Saint Bees, Cumberland, and Peter Swires Horsman, Saint John's Beckermet, Cumberland—Improved machinery for preparing flax, hemp, and other fibrous substances for spinning.

1870. George Wall, Manchester—Improvements in machinery or apparatus for the manufacture of pottery.

1896. William Campion, Nottingham—Improvements in the manufacture of warp fabrics.

1929. John Lockhart White and Henry Henderson, and James Couper, senior, Glasgow—Improvements in water-closets.

1937. William Brownfoot, Leeds—Improved instrument or apparatus for raising, lowering, and adjusting Venetian blinds.

1971. John Wesley Hackworth, Priestgate Engine Works, Darlington—Improvements in steam engines and in gearing connected therewith.

WEEKLY LIST OF DESIGNS FOR ARTICLES OF UTILITY REGISTERED.

Date of Registration.	No. in the Register.	Title.	Proprietors' Names.	Address.
Nov. 1.	3654	Improved Hand Railway Lamp	Parrott and Pickin	32 & 63, Easy Row, Birmingham.
„ 9.	3655	Jar Neck and Stopper	W. Powell and Son	Temple Gate, Pottery, Bristol.

INDEX TO VOLUME II.

ERRATA.

Page 27—In the second edition of the abstract of Dr. Playfair's lecture on Food, an important typographical error has been corrected. The last line on the Prison Diet, described as "solitary confinement," should be struck out, as it was a reprint of the line of diet for classes 4, 8, and 7. These classes have 229 oz. per week of food for female prisoners, but for males 271 oz.

Page 132, col. 2, line 6—For "recovered," read "revived;" line 16, for "part or parts," read "port or ports;", line 20, for "their reports," read "these respects;" line 21, for "than," read "through," for "or," read "than can;" line 24, for "all at once in some point," read "them at some one or more points;" line 25, for "and," read "or."

Page 141, col. 1, line 8—For "Rushbrook, Capt. the Hon. George, M.P.," read "Rushout, Capt. the Hon. George, M.P."

Page 177, col. 1, line 30—For "Mr. Hasler, having, &c.," read "Mr. T. Ashton, having, &c."

Page 287, col. 1, line 7—For "about £1,000,000," read "about £12,000,000."

Page 340, col. 1, line 22—For "G. Gore, M.D.," read "G. Gore."

Page 370, col. 1, line 37—For "He had also, &c., to Italian hemp." read "Cord 14 inches in length of Italian hemp broke with 165 lbs.; Petersburgh broke with 180 lbs.; and Rhea-fibre cord with 325 lbs." Also in same page and col., in 3rd line of Table, 5th col., for "30,488," read "20,488."

Page 408, col. 2—The proceedings of the Clapham Literary and Scientific Institution are reported under the head of Camberwell. The latter should have stopped at line 27, "great humour and cleverness." From "On the 21st inst., &c.," refers to the Clapham Institution.

Page 471, 3rd paragraph, line 1—For "£900,84, &c.," read "£900,48, &c.;" and in last paragraph but one, for the fraction $\frac{840}{186449}$, read $\frac{840}{861469}$.

Page 475, col. 2, line 51—For "J. Bull," read "J. Ball."

Page 578—Mr. Geo. G. French (Poole Mechanics' Institute) is reported to have asked a question during the discussion on the "Literary and Scientific Institutions Bill." The question was put by Mr. W. H. Reveley, the representative of the Poole Literary Institute.

Page 578, col. 2—The paragraph at the end of the sub-heading "Power of Borrowing," commencing with "After some, &c.," and ending with "clearly defined," was inserted in error, the resolution having been withdrawn.

Page 590, col. 1, line 36—For "Gadesden, George Arthur," read "Gadsden, George Arthur."

Page 809, col. 2, line 4—For "40*s*." read "43*s*. 4*d*." In second Dr. Account, line 5, for "cost of sowing," read "cost of seed;" and for second Cr. Account substitute following:—

By Cash received for seed—			
89½ bushels, at 90*s*.	£40	5	6
12 ditto, kept	5	4	0
Inferior seed for cattle	2	1	0
Total value of seed	£47	14	6
By Cash received for flax-fibre—			
379 stones of 16 lb. at 6*s*.	113	14	0
	£161	8	6

LIST OF MEMBERS

OF THE SOCIETY FOR THE ENCOURAGEMENT OF

ARTS, MANUFACTURES, AND COMMERCE,

AND

LIST OF INSTITUTIONS IN UNION.

SEPTEMBER 29th, 1854.

COUNCIL AND OFFICERS,

101st SESSION, 1854-5.

President.

H.R.H. PRINCE ALBERT, F.R.S., &c., &c.

Vice-Presidents.

Lord Ashburton, F.R.S.
Harry Chester.
Henry Cole, C.B.
C. Wentworth Dilke.
William Ewart, M.P.
The Earl Granville, F.R.S.
Lord Robert Grosvenor, M.P.
The Earl of Harrowby, F.R.S.
The Dean of Hereford.
Henry Thomas Hope.
Joseph Hume, M.P., F.R.S.
William Hutt, M.P.
George Moffatt, M.P.
The Duke of Newcastle.
Lieut.-Gen. Sir C. Pasley, K.C.B., F.R.S.
Samuel Morton Peto, M.P.
Dr. Lyon Playfair, C.B., F.R.S.
John Scott Russell, F.R.S.
William Tooke, F.R.S.
The Lord Bishop of Winchester.

Other Members of the Council.

Lord Berriedale.
William Bird.
Rev. Dr. Booth, F.R.S.
Thomas De la Rue.
Lieut.-Col. F. M. Eardley-Wilmot, R.A.
Viscount Ebrington.
Peter Graham.
John Cameron Macdonald.
Sir John Ramsden, Bart., M.P.
Samuel Redgrave, *Treasurer*.
W. Wilson Saunders, F.R.S., *Treasurer*.
Thomas Twining, Jun.
George Fergusson Wilson.
Thomas Winkworth.

Auditors.

William Frederick Harrison
Matthew Marshall.

Honorary Solicitor.

William Tooke, F.R.S.

Secretary.

Peter Le Neve Foster.

Assistant Secretary.

James Forrest.

Financial Officer.

Samuel Thomas Davenport.

LIST OF MEMBERS

AND DATE OF ELECTION.

1844. H.R.H. The PRINCE ALBERT, K.G., D.C.L. F.R.S. &c. &c

1854. Abbott, Robert, 23 High Holborn
1853. Absolon, William Henry, 2 Haymarket
1824. Acland, Sir Thomas Dyke, Bart., M.P., F.R.S., 85 Jermyn street
1854. Acland, Thomas Dyke, Athenæum Club, Pall Mall
1851. Adams, John D., 57 Haymarket
1852. Adams, Robert, Falkirk
1853. Adams, William, Ebbw Vale Works, near Newport, Monmouthshire
1847. Adams, William Bridges, Adam street, Adelphi
1850. Addey, Henry Markingfield, 21 Old Bond street
1853. Adye, Capt. J. Miller, R.A., Sheerness
1816. Ainger, Alfred, 2 Carlton hill, Edgware road
1852. Akroyd, Edward, Halifax
1854. Albrecht, John, 27 Victoria street, Westminster
1850. Aldrich, Stephen J., 8 Park road, Upper Holloway
1853. Allan, James, 7 York terrace, Regent's park
1853. Allan, Thomas, 1 Adelphi terrace
1853. Allcroft, John Derby, 97 Wood street, City
1852. Allen, The Ven. Archdeacon, Shrewsbury

1847. Allen, George John, Dulwich College
1853. Allen, James, 22 Gloucester street, Oxford road, Manchester
1845. Allison, Joseph, 238 Regent street
1849. Allison, Ralph, 108 Wardour street, Soho
1852. Allport, James, Midland Railway, Derby
1822. Ames, John, Clevelands, near Lyme, Dorset
1845. Ames, Lionel, The Hyde, St. Alban's
1852. Ames, Thomas Harling, 11 John street, Oxford st.
1843. Amos, Charles Edward, 57 Nelson square
1852. Anderson, Sir Charles H. J., Bart., Lea hall, Gainsborough
1849. Anderson, Sir James, M.P., Glasgow
1847. Anderton, James, 20 Bridge street, Blackfriars
1848. Andrews, Major, 13 Onslow crescent, Brompton
1850. Angell, Joseph, 10 Strand
1851. Ansell, Thomas. M.D., Harley place, Bow road
1851. Ansted, David Thomas, M.A., F.R.S., 17 Manchester street, Manchester square
1826. Antrobus, Sir Edmund, Bart., 146 Piccadilly
1853. Appold, John George, 23 Wilson street, Finsbury
1850. Archibald, Charles Dickson, F.R.S., 38 Portland place, Regent street
1854. Armstrong, William George, F.R.S., Newcastle-on-Tyne
1816. Arnold, J. S., 31 Golden square
1854. Ashburton, Lord, F.R.S., Bath house, 82 Piccadilly
1845. Ashurst, William Henry, 6 Old Jewry
1850. Ashurst, William Henry, jun., 6 Old Jewry
1852. Ashworth, Joseph, Pendleton, near Manchester
1852. Asperne, William Dent, London and Westminster Bank, 86 Whitechapel
1853. Aston, William, Hereford
1852. Atkinson, John Staines, Rochester
1849. Atkinson, William, 8 Taviton street, Gordon square
1851. Auldjo, John, F.R.S., Noel house, Kensington
1822. Austin, Benjamin, 6 Montague place, Russell sq.
1852. Austin, Frank, 38 Doddington grove, Kennington

1853. Baber, Rev. Harry, M.A., Whitelands, Chelsea
1854. Bailey, Edwin, Cirencester
1821. Bailey, George, 13 Lincoln's inn fields
1810. Bailey, Sir Joseph, Bart., M.P., 26 Belgrave square, and Nantyglo, near Abergavenny
1846. Bain, William, M.D., Brunswick st., Blackwall
1852. Baker, George, 13 Princes gate, Kensington
1849. Baker, William, 30 Cranbourne st., Leicester sq.
1823. Balcarras, the Earl of, 21 Berkeley square
1853. Ball, John, 57 Coleman street, City
1852. Banes, George Dann, H.M. Dockyard, Chatham
1848. Banks, Rev. S. H., D.C.L., Dullingham, Newmarket
1852. Bannister, Joseph, 63 Coleshill street, Eaton square
1851. Barber, George, 50 Mark lane
1851. Barber, William, 19 St. Paul's Church yard
1826. Barclay, Arthur, F.R.S., Park street, Southwark
1839. Barclay, George, 28 Castle street, Leicester square
1853. Barclay, Henry Ford, the Gutta Percha Company, 18 Wharf road, City road
1852. Barker, Thomas Herbert, M.D., Bedford
1847. Barlow, Charles, 89 Chancery lane
1854. Barlow, Rev. John, M.A., F.R.S., 5 Berkeley st., Piccadilly
1821. Barlow, Peter, F.R.S., Royal Military Academy, Woolwich
1853. Barnard, John Ansley Louis, 25 Holloway place, Holloway
1854. Barnard, John Edward, Merlin Haven, near Wotton-under-edge
1843. Barnes, William, Church court, Old Jewry
1849. Barnett, Miss M. G., 5 Gloucester terrace, Regent's park
1853. Barrett, Richard, 13 Mark lane
1853. Barron, Francis J., 436 Strand
1835. Barry, Sir Charles, R.A., F.R.S., 1 Old Palace yd., Westminster
1835. Barton, William Henry, Royal Mint
1851. Baskcomb, G. H., Chislehurst, Kent
1854. Bastard, Thomas Horlock, Charlton, Blandford, Dorset
1853. Bastow, Robert, the Mount, Wilmington, Kent
1853. Batchelor, Dr. W., 9 Finsbury place south
1840. Bateman, Joseph, LL.D., Barnard Castle
1836. Bates, Joshua, 21 Arlington street, Piccadilly
1850. Bax, Edward, 1 Charing cross
1852. Baxter, Robert Dudley, Highfield, Doncaster
1852. Bayliff, Rev. Thomas T. L., Bishop's Stortford
1853. Bayne, A. D., Norwich
1852. Beadel, James, 25 Gresham street, City
1847. Beard, George, 25 Carey street, Lincoln's inn
1852. Beard, John Barron, 12 Egremont pl., King's cross
1853. Beardsill, Isaac, Thongsbridge, near Huddersfield
1844. Beattie, Joseph, Railway Station, Nine Elms
1853. Beaumont, Wentworth Blackett, M.P., 144 Piccadilly
1853. Beldam, Valentine, Royston
1854. Bell, Jacob, F.L.S., 15 Langham place
1847. Bell, James, M.P., 1 Devonshire place, Marylebone
1847. Bell, John, 15 Rutland gate, Hyde park
1854. Bellford, Auguste E. L., 16 Castle street, Holborn
1853. Belshaw, Thomas, 3 Adelaide pl., London bridge
1850. Benbow, James, jun., 32 Bankside
1851. Bennett, John, 65 Cheapside
1845. Bennett, Joseph, 20 South parade, St. James's pk.
1853. Bennison, William, 4 Fitzroy square
1852. Bennoch, Francis, 77 Wood street, Cheapside
1849. Bentley, John, 9 Portland place
1851. Berriedale, Lord, 17 Hill street, Berkeley square
1850. Bessemer, Henry, Baxter house, Old St. Pancras rd.
1853. Best, Hon. and Rev. Samuel, M.A., Abbott's Ann, Andover
1849. Best, William, Gresham Club, City
1853. Bethell, John, 8 Parliament street, Westminster
1843. Bethell, Sir Richard, M.P., 3 Stone buildings, Lincoln's inn
1848. Bettridge, John, jun., 6 Halkin street west, Belgrave square
1848. Betts, Edward Ladd, 9 Great George street, Westminster
1848. Bevan, William, 5 Martin's lane, Cannon street
1849. Beyers, Charles, 63 Cecil street, Manchester
1848. Biden, John, 37 Cheapside
1854. Bigelow, Erastus Brigham, Boston, U.S.
1853. Bigg, Henry Heather, 15 Weymouth street, Portland place
1853. Bigge, Rev. Henry J., Rockingham, Northamptonshire
1852. Bird, James, Greenfield, Canton, near Cardiff
1851. Bird, Thomas, 7 Richmond buildings, Dean street, Soho
1851. Bird, William, 5 Martin's lane, Cannon street
1853. Birks, Edward, Sheffield
1850. Birt, Jacob, 30 Sussex gardens, Hyde park
1822. Bishop, George, F.R.S., South villa, Inner circle, Regent's park
1850. Blackwell, Samuel Holden, Russell's hall, West Dudley
1844. Blackwell, Thomas Evans, Cornwallis grove, Clifton, Bristol
1853. Bladon, Thomas, Uttoxeter
1853. Blair, Harrison, Ashwood lodge, near Manchester
1850. Blake, Charles Henry, 4 Stanley villas, Notting hill
1852. Blanchard, Colonel, C.B., Woolwich
1852. Bland, William Russell, 153 Fleet street
1854. Blandford, Marquis of, M.P., 36 Brook street
1842. Blashfield, John Marriott, Cement Factory, Mill Wall, Poplar
1853. Blews, W. H. M., Birmingham
1852. Bloomfield, Joseph Barber, Poole, Dorsetshire
1854. Blount, John Patterson, 2 Lonsdale sq., Islington
1853. Blundell, Henry, Hull
1823. Bodkin, Wm. Henry, 8 King's bench walk, Temple

1849. Bohn, Henry George, York street, Covent garden
1847. Boileau, Sir John Peter, Bart., F.R.S., 20 Upper Brook street
1852. Bolton, Thomas, 17 Hamilton street, Camden town
1851. Bond, Edward, 176 Oxford street
1849. Bone, William, jun., 76 Fleet street
1854. Bonham-Carter, John, M.P., Petersfield, and 82 Eccleston square
1852. Bonsor, James, 104 Fore street, Cripplegate
1842. Booker, Thomas William, M.P., Velindra house, Cardiff
1853. Boosey, Samuel, 7 Nutford place, Edgware road
1852. Booth, Rev. James, D.C.L., F.R.S., the Vicarage, Wandsworth
1854. Boothby, Charles Edward, Privy Council Office, Whitehall
1845. Borthwick, Michael Andrew, 26 Charles street, Haymarket
1822. Bosanquet, Augustus, 32 Fenchurch street
1830. Botfield, Beriah, F.R.S., 10 Sackville st. Piccadilly
1852. Boughton, Peter, Hounslow
1853. Boulton, George, 21a Northampton square
1851. Bowden, Thomas, 1 Sunfield terrace, Shooter's hill road, Blackheath
1838. Bowen, James Hill, 1 Whitehall
1838. Bower, George, 6 Tokenhouse yard, City
1854. Bower, George, St. Neot's, Huntingdon
1853. Bowring, Edgar Alfred, Board of Trade, Whitehall
1829. Braby, James, 18 Cramer place, Waterloo road
1854. Bradbury, Henry Riley, Whitefriars
1850. Brady, Antonio, Admiralty, Somerset house
1854. Brady, John, M.P., 1 Warwick terrace, Pimlico
1844. Brae, Andrew Edmund, Park square, Leeds
1852. Braikenridge, Francis Jerdone, 16 Bartlett's buildings, Holborn
1852. Braikenridge, George John, 16 Bartlett's buildings, Holborn
1819. Braithwaite, John, 42 Gower street, Bedford square
1851. Brandon, Woodthorpe, 1 Robert street, Adelphi
1838. Branston. Robert Edward, 36 St. Andrew's hill, Doctor's Commons
1854. Brett, Rev. William, M.A., Linton, Cambridgeshire
1851. Brettle, Edward, 119 Wood street, City
1852. Brewer, William, M.D., 21 George st., Hanover sq.
1835. Brickwood, John Strettell, South Sea House, Threadneedle street
1853. Bridson, Henry, Bolton-le-Moors
1853. Briggs, Arthur Rennie, Lewes, Sussex
1851. Bright, James, M.D., 12 Cambridge sq., Hyde park
1812. Bristol, the Marquis of, F.R.S., 6 St. James's square
1853. Broad, Charles William, Dover
1850. Broad, Robert, Horseley Iron Works, Tipton, Staffordshire
1806. Broadwood, Thomas, 17 Cadogan place, Belgrave square
1838. Brocklehurst, John, M.P., 33 Milk st., Cheapside
1843. Brook, Charles, Healey house, Huddersfield
1850. Brook, Richard Joseph, 1 Poultry, City
1842. Brookes, William, 25 Mark lane
1853 Brookes, William, 73 Chancery lane
1851. Brooks, Henry, 3 North place, Cumberland market, Regent's park
1851. Brooks, Samuel William, 32 Cardington street, Hampstead road
1854. Brooks, Vincent. King street, Covent garden
1844. Brooman, Richard Archibald, 166 Fleet street
1847. Brown, Humphery, M.P., 2 Little Smith street, Westminster
1852. Brown, Octavius, 17 Charles street, Grosvenor sq.
1847. Brown, Robert, Etruria, Staffordshire
1852. Brown, Robert Charles, 4 Robert street, Adelphi
1850. Brown, Robert J., 23 Savile row
1851. Brown, Samuel, 39 King street, City
1853. Brown, William, M.P., Richmond hill, near Liverpool
1853. Brown, William, Chester
1853. Brown, William George, 9 Whitehorse lane, Stepney
1844. Browne, Lieut.-Colonel Henry, H.E.I.C.S., 28 Soho square
1854. Browne, Rev. J. C., D.C.L., Dudley, Worcestershire
1854. Browne, T. Beale, 31 Upper Berkeley street, Portman square
1821. Browning, James, 113 St. John street
1847. Brunel, Isambard Kingdom, F.R.S., 18 Duke street, Westminster
1838. Buccleuch, the Duke of, K.G., D.C.L., F.R.S., Montague house, Whitehall
1852. Buckley, Major-Gen., New hall, Salisbury
1853. Buckmaster, J. C., Battersea
1850. Bull, John, 52 St. Martin's lane
1854. Bullen, Edward, A.M., 37 Golden square
1849. Bunn, Lockington, 19 Walbrook
1851. Burch, Joseph, Crag Works, Macclesfield
1851. Burn, R. Scott, Bank cottage, Eaton Norris, Stockport
1850. Burnet, Boyd, 2 Piazza, Covent garden
1850. Burnet, Richard, Piazza, Covent garden
1850. Burstall, Robert Kilby, 38 St. Martin's lane
1849. Burt, Henry Potter, 2 Charlotte row, Mansion house
1852. Burton, Alfred, 36 Marina, St. Leonard's
1829. Burton, Decimus, F.R.S., 6 Spring gardens
1854. Burton, William S. 39 Oxford street
1852. Bushell, Frederick William, Basingstoke
1850. Butler, Charles Salisbury, M.P., Cazenones, Upper Clapton, Middlesex
1854. Butler, Paul, 1 Lowndes square
1848. Butterworth, Joshua W., F.S.A., 7 Fleet street

1824. Cabbell, Benjamin Bond, M.P., F.R.S., 1 Brick court, Temple
1854. Caird, James, 9 Little Ryder street, St. James's
1854. Cairns, Hugh M'Calmont, M.P., 5 New square, Lincoln's inn
1854. Caldicott, William, Freighton Lodge, near Colchester
1852. Calvert, Frederick Crace, Manchester
1851. Cameron, Hugh Innes, 1 Hyde park gate, Kensington gore
1849. Campbell, Dugald, 7 Quality court, Chancery lane
1848. Campbell, Duncan, Emlyn cottage, Newcastle Emlyn, South Wales
1849. Campbell, Sir James, Stracathro, Glasgow
1846. Campin, Frederick William, 156 Strand
1853. Canning, Viscount, 10 Grosvenor square
1853. Cantrell, William, Wirksworth
1854. Capel, Rev. George, Carshalton, Surrey
1854. Caplin, Dr. J., Strawberry hill, Pendleton, Manchester
1853. Carthew, Peter, St. Mary Abbott's terrace, Kensington
1847. Cary, Francis Stephen, 21 Bloomsbury street, Bedford square
1843. Carlile, James Emlyn, Hampstead
1851. Carlisle, the Earl of, F.R.S., 12 Grosvenor place
1851. Carne, John, 15 Finsbury circus
1851. Carter, John, Park lodge, Park road, Stockwell
1852. Cartwright, Peplow, Oswestry
1851. Cassell, John, 35 Acacia road, St. John's wood
1854. Castle, Henry James, 7 Chancery lane
1851. Causton, Joseph, 47 Eastcheap, City
1853. Cawdor, Earl of, Stackpole court, Pembroke, and 74 South Audley street
1852. Cazalet, Rev. William Wahab, 4, Tenterden street, Hanover square
1853. Chadwick, David, Salford
1847. Chadwick, Edwin, C.B., 4 Stanhope street, Hyde park gardens
1852. Chaffers, Alexander, 43 Bedford row
1852. Chalk, James Jell, 80 Warwick square, Piml
1852. Challinor, William, Leek

1851. Challoner, Colonel, Portnall park, Chertsey
1852. Chambers, George, High Green house, near Sheffield
1854. Chambers, Thomas King, M.D., 1 Hill st., Berkeley square
1854. Chambers, William, jun., Llanelly
1852. Chance, Robert Lucas, Glass Works, near Birmingham
1854. Chanter, John, 2 Arnold ter., Bromley, Middlesex
1849. Chantrell, Robert Dennis, 4 St. Mary's road, Canonbury
1847. Chaplin, William, jun., 13 Henrietta street, Cavendish square
1850. Chapman, Edward, 13 Boltons, West Brompton
1854. Charley, William, Seymour hill, Belfast
1853. Chaundler, James, Odiham
1852. Chesson, F. W., 71 Market street, Manchester
1852. Chester, Harry, Privy Council Office, Whitehall
1853. Child, George, 2 Dunster court, Mincing lane
1853. Child, William Dimsdale, Forty hill, Enfield, Middlesex
1854. Childs, James, Cato lodge, Gilston road, Brompton
1849. Chown, Henry, 28 St. Swithin's lane, City
1848. Chubb, John, St. Paul's churchyard
1852. Chubb, W. T., Fordingbridge
1853. Clabon, John Moxon, 21 Great George street, Westminster
1843. Clarendon, the Earl of, K.G., 1 Grosvenor crescent, Belgrave square
1848. Claridge, George, 10 Mark lane
1854. Clark, Daniel Kinnear, Great North of Scotland Railway, 177 Union street, Aberdeen
1853. Clark, Rev. Samuel, Battersea
1849. Clark, Thomas, Ordnance Office, Pall Mall
1847. Clarke, Robert, 8 St. George's ter., Regent's pk.
1842. Claudet, Antoine, 107 Regent street
1854. Clench, Edmund, 2, Lansdowne terrace, Clapham
1853. Clive, the Venerable Archdeacon, Welshpool
1851. Clowes, Edward, 18 Endsleigh st., Tavistock sq.
1851. Clowes, George, 57 Russell square
1853. Clutton, John, Whitehall place
1852. Clutton, Rev. Ralph, Saffron Walden
1838. Coathupe, Charles Thornton, 3 Park row, Bristol
1851. Cobbett, Edmund, Villiers street, Strand
1849. Cobbett, Richard, jun., 25 Northumberland street, Strand
1850. Cochrane, Alexander Brodie, Woodside, near Dudley
1854. Cochrane, John, Crystal Palace, Sydenham
1851. Coffey, John Ambrose, Providence row, Finsbury
1853. Coe, John, Bank of England
1850. Colby, Thomas, 16 High street, Newport, Monmouthshire
1849. Cole, Charles Augustus, Kew cottage, Kew
1846. Cole, Henry, C.B., Gore house, Kensington
1852. Cole, Henry Warwick, 3 New sq., Lincoln's inn
1854. Cole, Thomas, 6 Castle street, Holborn
1852. Coleman, Alfred, Bridgefield, Wandsworth
1849. Coles, William, 28 St. Peter's sq., Hammersmith
1824. Collard, George, 53 Old Steyne, Brighton
1853. Collins, Edward, 314 Oxford street
1854. Collins, Henry George, 22 Paternoster row
1853. Collins, William Whitaker, 15 Buckingham street, Adelphi
1851. Collinson, Capt. T.B., R.E., Waltham Abbey, Essex
1843. Colman, James, Stoke, Holy Cross, Norwich
1847. Colnaghi, Dominic, Pall Mall East
1817. Colquhoun, James, 3 Stratford pl., Oxford street
1853. Conybeare, John Charles, Kew green
1851. Cook, Arthur Bott, 6 Berkeley place, Connaught square
1854. Cooke, John, 14 St. Swithin's lane, City, and South Shields
1854. Cooke, Wakeman Edwards, 101 Upper Thames st.
1843. Cooke, William Fothergill, East Tytherley, near Stockbridge, Hants
1850. Cooper, Charles, 44 Pall Mall, Manchester
1850. Cooper, David, 5 Shoe lane
1853. Cooper, John Douglas, 8 New st., Spring gardens
1828. Cooper, William D. Cooper, Toddington Manor, Dunstable, Bedfordshire
1851. Corbett, Charles Joseph, 17 Gracechurch street
1853. Cottam, Edward, 1 Lower Belgrave place, Pimlico
1818. Cottam, George, 2 Winsley street, Oxford street
1854. Cottam, George Hallen, 4 Chalcot villas, Adelaide road, Hampstead
1853. Cotton, Michael G., Wanstead, Essex
1853. Couchman, John William, 8 Princess terrace, Barnsbury park, Islington
1854. Coulthard, Joseph, Croft house, Brampton, Cumberland
1850. Countze, George Henry, 102 Long Acre
1853. Courtauld, George, 2 Carey lane, Goldsmith's hall
1844. Courtney, William, jun., 54 Oxford ter., Hyde pk.
1848. Coutts, Miss A. Burdett, 1 Stratton st., Piccadilly
1845. Cowell, Henry Bridges, 4 Compton st., Ball's pond
1848. Cowley, John Christian, 14 Dorset sq., Regent's pk.
1854. Cox, Dr. Thomas, Dulwich College Grammar School
1853. Cox, Thomas, 28 and 29 Southampton st., Strand
1847. Crace, John Gregory, 14 Wigmore street, Cavendish square
1851. Crace, Henry Winfield, 19 Buckingham st., Strand
1846. Crampton, Thomas Russell, 10 Buckingham street, Strand
1817. Crawter, Henry, 5 Bedford row
1847. Creswick, Thomas, R.A., Linden grove, Bayswater
1851. Crickitt, Robert Edward, 20 Bennet's hill, Doctor's Commons.
1853. Croll, Alexander Angus, 28 Coleman street
1852. Cromartie, M. W., Victoria road, Kensington
1851. Crooks, William, Radcliffe Observatory, Oxford
1852. Crowfoot, W. J., M.D., Beccles
1852. Crowley, Nicholas J., 13 Fitzroy st., Fitzroy sq.
1852. Crossley, John, Elm wood, Halifax
1853. Cruickshank, Patrick, 17 Gloucester gardens, Westbourne terrace
1819. Cubitt, Thomas, 3 Lyall street, Pimlico
1843. Cubitt, William, M.P., Gray's Inn road
1852. Cullington, Daniel, jun., 2 Craven street, Strand
1846. Cundall, Joseph, 168 New Bond street
1851. Cundy, Samuel, 29a Lower Belgrave place, Pimlico
1853. Cunliffe, Edward, Highbury place
1853. Cunningham, H. D. P., R.N., Gosport, Hants
1852. Cunningham, James Mackay, M.D., Hailsham, Sussex
1845. Curling, Joseph, 18 Cheapside
1840. Cursetjee, Ardaseer, F.R.S., 4 Grove terrace, Hammersmith
1848. Curtis, Sir William, Bart., Coynham house, Ludlow
1853. Curtis, William, Alton, Hants
1854. Curtis, William Joseph, 23 Birchin lane
1852. Curwen, Rev. H., Workington
1848. Curzon, Hon. Edward Cecil, 1 Whitehall
1842. Cutler, Job, Spark Brook, Birmingham

1849. Dalton, William Henry, 28 Cockspur street
1849. Darby, Abraham, Stoke court, near Slough
1853. Dargan, William, Harcourt street, Dublin
1852. Darlington, John, Shipley hall, near Leeds
1853. Davies, T. H., 19, Hanover street Regent street
1853. Davis, Elias, 54 Tavistock square
1852. Davis, Henry John, Newport, Monmouthshire
1852. Davis, Horatio, Mount Beacon house, Bath
1851. Davis, Richard Francis, Woodfield lodge, Harrow road
1852. Davis, Richard Powell, Tredegar Works, Newport, Monmouthshire
1817. Davidson, Thomas, 13 St. George's place, Knightsbridge
1843. Davison, Robert, Dowlais Iron Works, Merthyr Tydvil
1853. Dawbarn, George, Wisbech

1853. Dawbarn, Robert, Wisbech
1854. Dawson, George, M.A., Birmingham
1853. Dawson, John, Russell villas, Ampthill square, Hampstead road
1844. Day, James William, Pelaw house, Chester-le-Street
1848. Day, William, Gate street, Lincoln's inn fields
1817. Deacon, James Henry, Holwell house, near Tavistock
1850. Dean, Arthur, 29 Norfolk road, St. John's wood
1850. Dean, John, London bridge
1851. Dear, Charles, 26 Upper Gloucester place, Dorset square
1852. Debary, Peter Francis, Privy Council Office, Whitehall
1847. De la Beche, Sir Henry Thomas, F.R.S., Museum of Practical Geology, Jermyn street
1851. De la Rue, Thomas, 84 Westbourne grove
1847. De la Rue, Warren, F.R.S., 110 Bunhill row
1854. De Vincenzi, Joseph, 8 Grosvenor street, Grosvenor square
1850. Delamotte, Philip Henry, Crystal Palace, Sydenham
1852. Delepierre, Octave, LL.D., F.A.S., 18 Gloucester terrace, Hyde park
1851. Delolme, Henry, 48 Rathbone place
1851. De Mattos, William N., 6 Jeffrey sq., St. Mary Axe
1852. Denison, Edmund Beckett, 42 Queen Anne street
1852. Denison, John Evelyn, M.P., 9 Stratton street, Piccadilly
1849. Dennis, John Charles, 122 Bishopsgate st. Within
1852. Dent, Lancelot, 8 Fitzroy square
1818. Dew, Dyer, 11 Clapham road place, Clapham road
1850. Dick, Quintin, Curzon street, May fair
1849. Dickens, Charles, Tavistock house, Tavistock sq.
1853. Dickenson, Henry, Coalbrook dale, near Wellington, Salop
1853. Dickenson, Joseph, M.D., Great George street, Liverpool
1854. Dickson, James Hill, Patent Flax Works, Grove street, Deptford
1844. Dickson, Peter, 5 Chester terrace, Regent's park
1849. Dilke, Charles Wentworth, B.C.L., 76 Sloane street, Chelsea
1845. Dilke, C. W. 76 Sloane street, Chelsea
1849. Dillon, John, 106 Fore street, City
1853. Dobson, Miss, 22 Doughty street, Mecklenburgh square
1852. Dodd, J. M., 25 Campden grove, Kensington
1853. Donkin, Thomas, Hanover park, Peckham
1854. Donovan, Charles, 23 King William street, Strand
1850. Douglas, Capt. the Hon. Arthur, Dalmahoy, Edinburgh
1852. Doull, Alexander, 1 Morden terrace, Greenwich
1851. Doulton, Frederick, Brixton Rise
1851. Doulton, Henry, 7 Stockwell villas, Clapham
1853. Drax, John Samuel Wanley Sawbridge Erle, M.P. Chorborough park, Blandford, Dorset
1848. Dray, William, London bridge
1851. Drew, Beriah, Streatham, Surrey
1849. Drew, George, Shrubbery cottage, Streatham
1849. Drew, George Henry, 28 Parliament street
1853. Drew, John, 13 New Burlington street
1853. Drummond, Henry, M.P., Albury park, Guildford
1852. Du Cane, Richard, 11 Bolton street, Piccadilly
1853. Duckworth, William, 38 Bryanston square
1851. Duer, Samuel, Ravensbourne park, Lewisham
1847. Duff, Alexander Marshall, 8 Queen Anne street
1853. Duffield, William Ward, Chelmsford
1849. Duke, Sir James, Bart., M.P., 43 Portland place
1840. Duncan, John, New Inn, Strand
1852. Durnford, Frederick A. 44 Parliament street
1801. Dutton, John, Sambrook court, Basinghall street
1847. Dutton, William C., 5 Duncan terrace, Islington
1853. Dykes, David Stewart, Deptford pier
1852. Dyson, Rev. H. J. Barking, Essex
1851. Dyte, Henry, 6 King's bench walk

1854. Eady, George James, Campsbourne, Hornsey
1851. Eagleton, Edward, Blackheath
1853. Eales, William, Haxby hall, Haxby, near York
1849. Eardley-Wilmot, Lieut.-Colonel, F. M., R.A., Charlemont, near Armagh, Ireland
1846. Earle, Joseph, Palace gardens, Bayswater
1850. Earle, William, Grove hill, Camberwell
1843. Easton, James, 80 Blackfriars road
1847. Easton, James, jun. 80 Blackfriars road
1843. Easton, Percy S. 80 Blackfriars road
1854. Ebrington, Viscount, 17 Grosvenor square
1852. Eckstein, George Frederick, 16 Lloyd square
1852. Edgar, William, F.R.S., 19 Argyle st., Regent st.
1852. Edgeworth, T. Wrexham
1846. Edwards, George, Rye, Sussex
1844. Edwards, John, Beachfield, Northiam, Sussex
1853. Egerton, Edward Christopher, M.P., Elvetham park, near Winchfield
1833. Ellesmere, Earl of, 18 Belgrave square
1850. Elliott, Frederick H., 3 Rochester rd., Camden town
1853. Elliott, George Augustus, 13a Belgrave square
1854. Elliott, James, 48 Piccadilly
1848. Elliott, John H. 4 Martin's lane, Cannon street
1853. Elliott, Rev. William, 33 Great Coram street
1843. Ellis, James, M.D., Sudbrook park, Petersham, Surrey
1854. Ellis, Joseph, Bedford Hotel, Brighton
1853. Ellis, William, Champion hill, Camberwell
1854. Emslie, John, 10 Gray's inn terrace, Gray's inn rd.
1848. Errington, John Edward, 13 Duke st., Westminster
1847. Etchells, James, Gas works, Ashton-under-Lyne
1849. Evans, Frederick John, Gas works, Horseferry road, Westminster
1850. Evans, Jeremiah C., 33 King William street, City
1852. Ewart, William, M.P., 6 Cambridge sq., Hyde pk.
1853. Eykyn, Thomas, 22 Change alley

1847. Fairbairn, Peter, Wellington Foundry, Leeds
1843. Fairbairn, William, F.R.S., Manchester
1819. Faraday, Michael, D.C.L., F.R.S., Royal Institution, Albemarle street
1854. Farley, Thomas, Thornton heath, Croydon
1854. Farr, William, M.D., 1 Melina place, St. John's wood
1853. Fasson, George, 3 Adelaide place, London bridge
1853. Fauntleroy, Robert Thomas, Pottersfields, Tooley street, Southwark
1826. Fenn, Joseph, 105 Newgate street
1852. Fenton, Roger, 2 Albert terrace, Albert road, Regent's park
1853. Fergus, John, M.P., Kirkcaldy
1853. Ferguson, Joseph, M.P., Reform club
1854. Festing, Richard Grindal, 8 Buckingham gate
1816. Field, Joshua, F.R.S., Cheltenham pl., Lambeth
1851. Field, John, Dornden, near Tunbridge Wells
1854. Fielding, Edward, 30 Clifton road, St John's wood
1853. Fife, Earl of, Duff house, Banff
1854. Finch, Henry Young, 35 Cross street, Islington
1850. Finch, John, 26 Nelson square, Blackfriars
1850. Fisher, Anthony Lax, M.D., 14 York place, Portman square
1853. Fisher, Cyril Jeddere, 1 Paper buildings, Temple
1851. Fisher, Robert, Gresham Club, City
1849. Fitz-Cook, Henry, 13 New Ormond street
1854. Fladgate, William Mark, 64 Eaton square
1851. Fletcher, Alexander Pearson, 50 Pall Mall
1853. Foley, J. H. Hodgetts, M.P., Prestwood, Stourbridge
1854. Fontaine-Moreau, Peter Armand le Comte de, 4 South street, Finsbury
1842. Forbes, Henry, Bradford, Yorkshire
1852. Ford, Francis, 9 Milner street, Milner square
1851. Forman, R. H., Ordnance Office, Pall Mall
1851. Forster, Percival William, 11 Manor road, Upper Holloway
1853. Foster, John, 16 Wigmore street

1845. Fothergill, Benjamin, Ducie place, Exchange, Manchester
1853. Fothergill, Mark, 204 Upper Thames street
1847. Fowler, Francis E. H., 21 Savile row, Burlington gardens
1848. Fowler, John, 2 Queen's square pl., Westminster
1843. Fox, Sir Charles, 8 New street, Spring gardens
1853. Fox, William Johnson, M.P., 3 Sussex place, Regent's park
1852. Francis, E. N., 2 Duke street, London bridge
1853. Franklin, Frank, 4 Orsett terrace, Westbourne terrace North
1850. Franks, Augustus W., Oxford and Cambridge Club, Pall Mall
1843. Franks, George, Blackfriars road
1853. Fraser, Alexander, Messrs. Truman's, Spitalfields
1851. Freeman, John, Huddersfield
1853. Freeman, Joseph, 19 Artillery place, Finsbury
1854. Freeman, Robert, 3 Verulam buildings, Gray's inn
1802. Freeman, Stephen, Coventry
1853. Freer, Rev. R. Lane, Archdeacon of Hereford
1852. French, Gilbert John, Bolton, Lancashire
1849. Frodsham, Charles, 84 Strand
1845. Fry, Peter Wickens, 14 Montague st., Russell sq.
1854. Fry, Samuel James, 39 Picton street, Montpelier, Bristol
1843. Fuller, Francis, 29 Abingdon street, Westminster
1853. Fuller, George Leedham, St. Mary's rd., Peckham
1817. Fuller, J. G., 28 St. James's street
1853. Fussell, Alexander, 2 Oakley sq., St. Pancras

1854. Gadeden, George Arthur, South place, Albion road, Stoke Newington
1854. Gadesden, Augustus William, Leigh house, Tooting, Surrey
1852. Gainsford, Charles Elliott, 18 Duke st. Westminster
1851. Galabin, Thomas, 13 Upper grove lane, Camberwell
1853. Galsworthy, John, Gresham Club, City
1849. Gambart, J. Earnest, 25 Berners street, Oxford st.
1846. Gardiner, James R., Duchy of Cornwall, Somerset house
1849. Gardiner, Thomas, Golden Cross Hotel, Charing cross
1819. Garling, Henry, 27 Bedford row
1849. Garrard, Sebastian, Panton street, Haymarket
1852. Garraway, Frederick, jun., Boundary road, St. John's wood
1848. Garrett, George K., 9 Albion place, Blackfriars
1848. Garrett, Robert, Leiston Works, near Saxmundham, Suffolk
1849. Gass, S. H., 166 Regent street
1849. Gaury, John, 80 Watling street
1850. George, John, Cadogan lodge, Abbey road, St. John's wood
1853. Gibb, Capt. C. J., R.E., Hurst Castle, Lymington
1816. Gibbons, John, 345 Oxford street
1845. Gibson, Edward, jun., Hull
1849. Gibson, Right Hon. Thomas Milner, M.P., 49 Wilton crescent
1849. Gilbart, James William, F.R.S., the London and Westminster Bank, Lothbury
1854. Gilbee, W. A., 4 South street, Finsbury
1852. Gill, Kennedy, Accrington
1842. Gillett, William S., 37 Upper Harley street
1852. Glaisher, James, F.R.S., 13 Dartmouth terrace, Lewisham
1843. Glasscock, J. L., Bishop Stortford, Herts
1850. Glover, Joseph, 12 Provost road, Haverstock hill
1846. Glover, Thomas, 57 Middleton square
1836. Glynn, Joseph, F.R.S., 28 Westbourne park villas, Bayswater
1854. Goddard, Ebenezer, Ipswich
1852. Goddard, Samuel Palmer, Longton
1851. Goddard, Thomas, 8 King Edward street, Newgate street
1852. Godfrey, Joseph Silvester, Highgate
1822. Goding, James, 2 Belgrave square
1837. Goldsmid, Aaron Asher, 8 Cavendish square
1844. Goldsmid, Baron, F.R.S., St. John's lodge, Regent's park
1836. Goldsworthy, J. H., High street place, Stepney
1846. Gooch, John Viret, Railway Station, Stratford, Essex
1847. Gooch, Joseph H., Crescent, Camberwell grove
1853. Goode, William James, 19 South Audley street
1853. Goodeve, Thomas Minchin, King's College, Strand
1838. Goodwin, Charles, Lynn, Norfolk
1851 Goodwin, William Samuel, 33 Princes street, Leicester square
1853. Goolden, Charles, M.A., 7 South sq., Gray's inn
1849. Gore, Henry, Gas Works, Leeds
1852. Gorham, John, Tunbridge
1849. Gotto, Edward, 35a Great George st., Westminster
1854. Gowen, James Robert, F.R.G.S., F.G.S., 187a Piccadilly
1854. Gower, Hon. Frederick Leveson, M.P., 29 Upper Brook street
1850. Graham, Peter, 37 Oxford street
1853. Graham, William, 74 Old Broad street
1848. Granville, the Earl, F.R.S., 16 Bruton street
1853. Gray, John, 5 Billiter square, City
1853. Green, Stephen, Imperial Potteries, Lambeth
1849. Greene, Henry, 16 King William street, City
1854. Greenwell, George Clementson, Radstock, near Bath
1853. Gregg, S. G. 43 Rectory place, Woolwich
1846. Gregory, Charles Hutton, 1 Delahay street, Westminster
1854. Gregory, Isaac, Chorlton hall, near Manchester
1851. Gregory, Mark Henry, Wax Chandlers' hall, Gresham street
1853. Gregson, Samuel, M.P., 32 Upper Harley street
1853. Greig, Sir Hector, K.C.M. and G., 8 Ovington ter. Brompton
1842. Grenada, Agricultural and Horticultural Society of the Island of
1821. Grenfell, Charles Pascoe, 38 Belgrave square
1849. Grey, Earl, 13 Carlton house terrace
1851. Grey, Major-Gen. the Hon. C., Buckingham palace
1844. Grisbrook, William, Eastgate, Tenterden, Kent
1853. Grosvenor, Lord Robert, M.P., Moor park, Rickmansworth, Herts
1835. Grove, Christopher, 150 New Bond street
1852. Grove, George, 3 Adelaide place, London bridge
1853. Guiness, Arthur, 38 Lansdowne place, Brighton
1849. Gunter, Richard, Lowndes square
1848. Gunter, Thomas William, 7 and 8 Berkeley square
1848. Gurdon, William, Brantham, Manningtree
1854. Gurney, Samuel, jun., 65 Lombard street
1853. Gwilt, Alfred, 7 Union street, Southwark
1848. Gwilt, George, 8 Union street, Borough

1849. Habberfield, Richard, 31 Love lane, City
1853. Hackblock, William, The Rock, Reigate
1851. Haden, Francis Seymour, 62 Sloane street
1852. Haden, George, Trowbridge
1851. Haden, William, Dixon's green, Dudley
1849. Hailstone, Edward, Horton hall, Bradford, Yorkshire
1851. Hairs, George, 31 Milk street, Cheapside
1847. Hale, Warren, Orange street, Southwark
1849. Hale, Warren S. 73 Queen street, City
1844. Hall, George Frederick, 15 Norfolk st., Middlesex Hospital
1833. Hall, John, 3 Queen's gardens, Cleveland square, Hyde park
1850. Hall, Sparkes, 308 Regent street
1847. Hall, Spencer, Athenæum Club
1854. Hallett, George, 40 Stamford street, Blackfriars
1849. Hallowes, William, 32 Tavistock square
1851. Hambleton, Joseph, St. Marylebone Church Cottage

1853. Hambro, Baron C. Joachim, 70 Old Broad st., City
1847. Hamilton, Otho, 15 James's street, Buckingham gate
1822. Hammond, William, 9 Queen's sq., Bloomsbury
1852. Hammond, William Parker, 9 Scot's yard, Great Bush lane
1850. Hancock, Charles, 20 Tokenhouse yard
1848. Hancock, James Lyne, Goswell mews, Goswell road
1847. Hanhart, Michael, 64 Charlotte street, Rathbone place
1852. Harbin, George, Newton house, Yeovil
1849. Hardcastle, John, 22 Eastcheap
1848. Harding, Sir John Dorney, D.C.L., the College, Doctor's Commons
1853. Harding, John Thomas, 4 Cheapside
1851. Hardman, William, B.A., 21 Lincoln's inn fields
1829. Hardwick, Philip, R.A., F.R.S., 21 Cavendish square
1830. Hardy, Lieut. Robert W., R.N., Sion hill, Bath
1851. Hargrave, John Fletcher, 25 Old sq., Lincoln's inn
1853. Harker, John William, 24 Upper Barnsbury street, Islington
1854. Harris, Henry Edward, 17 Cannon pl., Brighton
1852. Harris, Thomas Philips, 52 Great Russell street, Bloomsbury
1850. Harrison, Edward M. 20 Chancery lane
1822. Harrison, George, 16 Carlton house terrace
1825. Harrison, Henry, 1 St. James's terrace, Maida hill West
1847. Harrison, John, 3 Grosvenor gate, Park lane
1851. Harrison, Thomas, Asphalte works, Regent's canal, Cambridge heath
1847. Harrison, Thomas Richard, 45 St. Martin's lane
1849. Harrison, Robert, 19 Friday street, City
1850. Harrison, William, Galligreaves house, Blackburn
1854. Harrison, William Frederick, Wandsworth
1852. Harrison, William George Southey, 20 Whitehall place
1853. Harrowby, the Earl of, F.R.S., 39 Grosvenor square
1851. Hart, Charles, 54 Wych street, Strand
1852. Hart, George, 253 Strand
1852. Hartop, Henry, Bamborough hall, Doncaster
1854. Harvey, Henry, 95 Hatton garden
1849. Harvey, John Keir, 25 Ely place, Holborn
1852. Harvey, William, Barnsley
1836. Hatchard, Rev. Thomas Goodwin, 187 Piccadilly
1849. Hawes, William, 17 Montague place, Russell square
1848. Hawkins, Benjamin Waterhouse, Belvidere road, Upper Norwood
1852. Hawkins, Major Rohde, British Museum
1853. Hawkshaw, John, F.R.S., 33 Great George street, Westminster
1851. Haynes, Francis Oliver, 13 New sq., Lincoln's inn
1851. Hayward, E. L., 79 Cornhill
1854. Headlam, Thomas Emerson, M.P., 30 Lincoln's inn fields
1851. Heal, John Harris, Grass Farm house, Church end, Finchley
1850. Healey, Timothy, Manor house, Hampton park, Middlesex
1852. Heane, Henry, Newport, Salop
1852. Heathcote, John, M.P., Tiverton, and 5 Warwick street, Charing cross
1829. Heberden, Thomas, M.D., 72 Park street, Grosvenor square
1851. Hedley, Thomas Abercrombie, Gas Engineering Offices, Banbury
1838. Helbert, John Helbert, 60 Gloucester place, Portman square
1849. Henderson, Andrew, Wadham lodge, Ealing
1816. Hendrie, Robert, 12 Titchbourne street
1851. Hendrie, Robert James, jun., 15 Blossom street, Norton Folgate
1850. Henry, Thomas Hetherington, F.R.S., 18 Lincoln's inn fields
1852. Hensman, Henry, Bank of England
1849. Henson, Henry Henson, 31 Chalcott villas, Haverstock hill
1853. Hereford, Dean of, Hereford
1853. Herring, Thomas Buckle, Finchley
1853. Hervey, the Rev. Lord Arthur, Bury St. Edmund's
1846. Heseltine, Samuel, jun., Stock Exchange
1848. Hetley, James Hicks, 35 Soho square
1847. Hewitt, Allen James, Old Hummums, Covent garden
1847. Hewitt, Frederick Keunard, 4 Fitzroy ter., Kentish town
1852. Heys, Henry, Barrhead, near Glasgow
1845. Hick, John, Bolton le Moors
1851. Hicks, John, 6 South crescent, Bedford square
1851. Hicks, Thomas, 9 Mincing lane
1847. Hickson, Samuel, Highgate
1846. Highton, Edward, British Telegraph Company, 29½ Royal Exchange
1849. Hill, Charles, 25 Hyde park square
1853. Hills, Rev. George, M.A., Parsonage, Great Yarmouth
1852. Hindley, Charles, M.P., Dartmouth house, Westminster
1846. Hippisley, John, Stone Easton, near Bath
1852. Hitchin, James, Lincoln
1815. Hoblyn, Thomas, F.R.S., White Barns, near Buntingford, Herts
1851. Hocking, Samuel, 7 John street, Adelphi
1851. Hodgett, William James, Wordsley, near Stourbridge
1850. Hoffstaedt, Augustus J., 6 Albion place, Blackfriars bridge
1833. Holford, James, Holford house, Regent's park
1854. Holland, Richard Leigh, Athenæum Club, Pall Mall
1848. Holland, William, Mount street, Grosvenor square
1853. Hollier, Elliot, Dudley
1847. Hollins, Michael Daintree, Stoke-upon-Trent
1853. Holme, Samuel, Liverpool
1846. Holmes, James, 4 New Ormond street
1849. Holtzapffel, Mrs. Charles Vaux, Long Acre
1850. Hooper, George Norgate, 28 Haymarket
1853. Hooper, John, M.D., Buntingford, Essex
1849. Hope, Henry Thomas, 116 Piccadilly
1852. Hope, Thomas Radford, Litherland, near Liverpool
1852. Hopkinson, W. L., M.D., St. Martin's, Stamford
1852. Hopwood, Charles H., 47 Chancery lane
1850. Horn, Thomas, 21 Marsham street, Westminster
1849. Horne, Henry, 26 Montagu square
1853. Horner, Edward, Halstead
1842. Horton, John, 38 Devonshire st., Queen's square
1847. Hoskyns, Chandos Wren, Wraxhall Abbey, Warwick
1848. Howard, Right Hon. Charles Wentworth G., M.P., 56 Park street, Grosvenor square
1849. Howard, Daniel, 22 Berners street, Oxford street
1854. Howard, Philip Henry, Corby castle, near Carlisle
1853. Howson, Rev. J. Saul, M.A., Principal of the Collegiate Institution, Liverpool
1847. Hoy, Henry Benjamin, 13 Roseberry villas, Tufnell park west, Kentish town
1853. Hubbard, Rev. George, Corfe castle, Dorset
1847. Hubert, Samuel Morton, St. Ann's hill, Wandsworth
1853. Hudson, J. W., Ph. D., Athenæum, Manchester
1850. Hudson, William, 19 Bennet's hill, Doctor's Commons
1851. Hughes, Edward, Royal Hospital, Greenwich
1825. Hughes, William Hughes, 2 Inner Temple lane
1848. Humby, George, 2 Aberdeen place, Maida hill
1812. Hume, Joseph, M.P., F.R.S., 6 Bryanston square
1853. Hume, William Burnley, Trinidad
1854. Hume, William Wentworth Fitzwilliam, M.P., 20 Curzon street, May-fair
1853. Humphreys, Edward, Deptford pier
1854. Hunt, F. Knight, Sydenham
1849. Hunt, James, 31 Parliament street
1852. Hunt, Robert, F.R.S., Museum of Practical Geology, Jermyn street
1853. Hunter, George Yeates, Cecil square, Margate

1854. Huntington, James, 4 Lowther cottages, Holloway road
1851. Huntley, Samuel, 74 New Bond street
1850. Huskisson, Henry Owen, 7 Judd place, Euston square
1853. Hutchinson, Rev. James, M.A., Berkhampstead
1852. Huthwaite, Stokeham, Bromley
1852. Hutson, Giles, Uxbridge
1853. Hutt, William, M.P., Gibside, near Gateshead
1851. Hutton, W. C., 6 Newgate street
1852. Hutton, James, 60 Burton crescent
1854. Huxtable, Rev. Anthony, Sutton Waldron, Blandford, Dorsetshire

1849. Ibbetson, Capt. L. L. Boscawen, F.R.S., Clifton House, Brompton
1816. Ilchester, the Earl of, 31 Burlington street
1850. Ingram, Herbert, 198 Strand
1850. Ionides, Alexander Constantine, Tulse hill, Surrey
1849. Ivory, Thomas, 9 Ainslie place, Edinburgh
1851. Ivyleafe, James, 1 London villas, St. John's wood

1848. Jackson, A. R., M.D., Warley, near Brentwood, Essex
1850. Jackson, John, 50 Rathbone place
1853. Jackson, Ralph Ward, Greatham hall, West Hartlepool
1853. Jackson, Samuel, 36 Red Lion street, Clerkenwell
1853. James, Jabez, 23a Broadwall, Stamford street
1849. Jeanes, John, 67 New Bond street
1848. Jee, Alfred Stanistreet, 6 John street, Adelphi
1851. Jee, Morland, 6 John street, Adelphi
1852. Jenings, Edmund John, 20 Upper Phillimore place, Kensington
1848. Jennens, T. H., jun., Birmingham
1848. Jennings, George, 29 Great Charlotte street, Blackfriars road
1849. Jennings, J. R., Wanstead, Essex
1853. Jenour, Harry James, 2 Field court, Gray's inn
1851. Jermyn, Harry, Peckham Rye
1853. Jewitt, Llewellyn, Plymouth
1850. Jobson, John, Litchurch Works, Derby
1848. Jobson, Robert, Holly hall, near Dudley
1850. Johns, Henry, 68 Upper Thames street
1852. Johnson, Edmund Daniel, 21 Ashley crescent, City road
1849. Johnson, Henry, 39 Crutched Friars, City
1853 Johnson, John Henry, 47 Lincoln's inn fields
1844. Johnstone, James, Larchill, Moffat
1853. Jones, Arthur O'Brien, Epsom
1853. Jones, H. Bence, M.D., F.R.S., 30 Grosvenor street
1850. Jones, James, 26 John street, Penton street
1850. Jones, Jenkin, 1 Camden square, Camden town
1843. Jones, John, 338 Strand
1851. Jones, J. Carrington, 6 Albert villas, Fulham
1851. Jones, John Hodgson, 1 Poet's corner, Westminster
1847. Jones, Owen, 9 Argyle place, Regent street
1849. Jones, Richard Lambert, 49 Porchester terrace, Bayswater
1852. Jones, Rev. W. Taylor, Romford
1847. Jordan, Thomas Brown, Gold Crushing Works, Rotherhithe
1853. Joynt, William Lane, Limerick
1852. Judge, Jasper Augustus Frederick, 14 King Edward street, Liverpool road
1854. Judkins, Charles Tiot, Cannon street west, City
1830. Judkins, Eimer, Beaufort buildings, Strand

1851. Kater, Edward, F.R.S, 4 Sussex gdns, Hyde pk.
1854. Keating, the Venerable Archdeacon, Limerick
1850. Keith, Daniel, 124 Wood street
1847. Keith, George, 36 Piccadilly
1852. Kell, William Ghrimes, 112 Westbourne terrace
1837. Kelsey, Richard, 73 Chiswell street
1835. Kemble, Horatio, Banstead park, Epsom, Surrey
1842. Kemp, George Tawke, 35 Spital square
1835. Kendall, Henry Edward, 17 Suffolk street, Pall Mall East
1850. Kent, George, 329 Strand
1849. Kerr, Mrs. Alexander, 67 Grosvenor street
1854. Kershaw, Joseph Hughes, Grove place, Brixton
1853. Kilburn, William Edward, 234 Regent street
1854. King, Alfred, C.E., Gas works, Liverpool
1850. Kingsford, Charles, 26 Mark lane
1849. Kingsford, Edward, London and Westminster Bank, Southwark
1851. Kingsford, Thomas, 26 Mark lane
1850. Kingsford, William Henry, 9 New Bridge street, Blackfriars
1854. Kingsley, Rev. William Towler, B.D., Sidney College, Cambridge
1851. Kirby, Richard Charles, War Office, Horse Guards
1848. Knight, Charles, 90 Fleet street
1851. Knight, George, 40 Foster lane, City
1853. Knight, J. Jordan, 37 Camden road villas
1853. Knight, Valentine, 3 Cornwall ter., Regent's park

1852. Lacy, Henry Charles, Richmond, Surrey
1852. Laffan, Capt. Robert Michael, R.E., M.P., 12 Wilton crescent, Belgrave road
1831. Laing, David Gordon, 2 Villiers street, Strand
1850. Lambert, Thomas, Short street, New cut
1850. Lancaster, Charles William, 151 New Bond street
1852. Lance, John Henry, Burlington lane, Chiswick
1831. Langdon, Augustus, 28 Great Russell st., Bloomsbury
1825. Lansdowne, the Marquis of, K.G., D.C.L., F.R.S., 54 Berkeley square
1847. Lapworth, Alfred, 19 Old Bond street
1854. Latham, Robert Gordon, M.D., F.R.S., 29 Upper Southwick street, Hyde park
1851. Lavanchy, John Robert, 6 New Burlington street
1838. Law, Thomas, 30 St. Swithin's lane
1854. Lawes, John Bennet, Rothamstead, St. Alban's
1849. Lawrence, Frederick, 94 Westbourne terrace
1854. Lawrie, James, 1 Newman's court, Cornhill
1848. Laws, Capt. John Milligen, R.N., Marchfield house, Binfield, Berks
1803. Lawson, Henry, F.R.S., 7 Lansdowne cres., Bath
1824. Leaf, William, 39 Old Change
1848. Leake, Frederick, 9 Warwick street, Regent street
1838. Le Couteur, Col. William Martin, F.R.S., Bellevue, Jersey
1848. Lee, Charles, 20 Golden square
1817. Lee, John, LL.D., F.R.S., Doctor's Commons
1853. Lee, Philip B., 5 Windsor terrace, Pimlico
1844. Lee, Stephen Henry, 12 Finsbury place
1851. Lee, Thomas, 5 George yard, Lombard street
1849. Leeks, Edward Frederick, 10 St. George's road, Belgravia South
1854. Leeman, George, York
1848. Lefevre, John Shaw, House of Lords
1851. Leighton, John, jun., 8 Lidlington place, Harrington square, Hampstead road
1848. Leman, Francis H., 15 Threadneedle street
1852. Lemon, Sir Charles, Bart., M.P., F.R.S., 46 Charles street, Berkeley square
1851. Leonard, Samuel William, 113 Upper Stamford street
1850. Leslie, Frederick, 59 Conduit street
1801. Levien, Solomon, New South Wales
1845. Levey, George, Great New street, Fetter lane
1854. Levi, Leoni, F.S.S., 12 The College, Doctor's Commons
1853. Levy, Moses, 26 Upper Harley street
1843. Lewis, Stephen, jun., 195 Regent street
1792. Lewis, Thomas
1851. Liddiard, William, Friday street
1852. Lindsay, Charles, 95 Upper Stamford street
1849. Lindley, Nathaniel, Acton green, Turnham green
1844. Lindley, William, 8 Adelphi terrace

1852. Lingen, Ralph Robert Wheeler, Privy Council Office, Whitehall
1834. Lister, William, 15 Manchester buildings, Westminster
1852. Litchfield, John, Epperstone cottage, near Southwell, Nottingham
1853. Lloyd, George, M.D., F.G.S., Norton lodge, near Warwick
1852. Lloyd, Sampson, Wednesbury
1847. Lobb, William, M.D., 12 Aldersgate street
1848. Locke, Joseph, M.P., F.R.S., 13 Duke st., Westminster
1845. Lockett, Joseph, Fennell street, Manchester
1854. Lockhart, A. Elliott, M.P., Putney
1852. Lockwood, H. F., Nun wood, Rawdon, near Leeds
1853. Logan, William Crauford, Cork
1851. Long, Charles Albert, 153 Fleet street
1850. Longbottom, Robert Isaac, Royal Polytechnic Institution
1852. Longmaid, William, 31 Beaumont sq., Mile end
1825. Lonsdale, the Earl of, F.R.S., 15 Carlton house ter.
1852. Loseby, Edward Thomas, 44 Gerrard st., Islington
1824. Lott, Thomas, 43 Bow lane, Cheapside
1851. Louch, William Stevens, 12 Buckingham street, Adelphi
1850. Lovegrove, James Samuel, Brunswick hotel, Blackwall
1850. Lovegrove, Samuel, 2 Upper St. Germain's terrace, Blackheath
1851. Lovejoy, William, Crouch hill, Hornsey
1818. Low, Robert, 330 Strand
1854. Low, Stephen Philpot, 124e Bishopsgate st. Within
1820. Lowe, George, F.R.S. 39 Finsbury circus
1847. Lowry, Joseph Wilson, 45 Robert street, Hampstead road
1852. Lucey, W. W., Marlborough
1850. Lucy, William, Birmingham
1845. Lund, Henry, Hare court, Temple

1851. Macdonald, John Cameron, 3 Churchyard court, Temple
1854. Mackenzie, Rev. Charles, M.A., 15 Gloucester terrace, Hyde park
1852. Mackie, Samuel James, Folkstone
1816. Macpherson, Richard, 76 Lombard street
1852. Macready, William Charles, Sherborne, Dorset
1820. Magrath, Edward, Athenæum Club, Pall Mall
1838. Mair, George, 41 Bedford place, Russell square
1854. Malcolmson, James, Campden hill, Kensington
1854. Manchester, the Bishop of, Athenæum Club, Pall Mall
1853. Manby, Charles, F.R.S. 25 Great George st., Westminster
1854. Manning, Samuel, Union place, New road
1853. Mansell, Alfred, 70 Old Broad street, City
1852. Mansell, Edward, 20 Halkin street West, Belgrave square
1820. Manvers, Earl, 13 Portman square
1853. Marcoartu, Arturo de, 30 Harley st., Cavendish sq.
1848. Marriott, Jeremiah, Dewsbury, Yorkshire
1850. Marshall, Edward Smith, 31 John street, Tottenham court road
1852. Marshall, Matthew, Bank of England
1853. Martin, Edwin Waller, Guildford
1852. Martin, Horace, Battle
1852. Martin, Rev. Samuel, 2 Middleton villas, Camden road, Holloway
1847. Martin, Samuel Dickinson, Flower bank, Burley, near Leeds
1852. Martin, Thomas, Reigate
1853. Martineau, David, Tulse hill, Surrey
1845. Martineau, William Henry, Goulston street, Whitechapel
1852. Mason, A. J., 46 Argyle square, New road
1848. Masters, Thomas, 333 Oxford street
1851. Matthew, James, 105 Upper Thames street
1850. Matthews, John, 2 Arthur street West, London bridge
1816. Matthews, William, 367 Strand
1854. Matthews, William, 1 Wigmore st., Cavendish sq.
1852. Maudslay, Henry, 4 Cheltenham place, Westmister road
1853. Maudslay, Joseph, 5 Cheltenham place, Westminster road
1815. Maudslay, Thomas, Cheltenham place, Westminster road
1848. Maw, Solomon, 11 Aldersgate street
1824. Mawley, Henry, 20 Gower street
1849. May, Charles, 3 Great George st., Westminster
1853. Mayall, John Edwin, 224 Regent street
1853. M'Alpine, William, Spring vale, Hammersmith
1844. M'Clean, John Robinson, 17 Great George street, Westminster
1853. M'Cormick, William, 2 Park square West, Regent's park
1854. M'Douall, Colonel James, 2nd Life Guards, Knightsbridge barracks
1849. M'Dougall, Alexander, 44 Parliament street, Westminster
1844. M'Ewen, Robert, H.M.S. "Amphion"
1849. M'Glashan, Alexander, 16 Long Acre
1854. M'Lauchlan, Frederick Holt, 3 Printing house sq.
1850. Mead, Charles Roper, 3 Langdale road, Hill street, Peckham
1850. Mechi, John Joseph, Tiptree hall, Kelvedon
1854. Mee, John, East Retford
1845. Meeking, Charles, Holborn hill
1839. Meinertzhagen, Daniel, 10 Moorgate street
1851. Mellish, Thomas Robert, 80 Sloane street
1853. Merchant, Thomas, Derby
1825. Merle, William Henry, 20 Prince's ter., Hyde pk.
1853. Merrifield, Mrs. Mary P., 8 Dorset gardens, Brighton
1848. Messenger, Samuel, Birmingham
1853. Michel, William, M.P., Bodmin
1850. Middleton, Richard, 18 Albion grove, Barnsbury park
1852. Miles, Philip W. S., Kingsweston
1851. Millman, the Rev. Henry H., Deanery, St. Paul's
1851. Miller, Taverner John, 7 Millbank street, Westminster
1852. Milligan, Robert, M.P. 2, Queen square, Westminster, and Bradford, Yorkshire
1853. Milner, Edward, Oxford house, Annerley road, Upper Norwood
1846. Minton, Herbert, Stoke upon Trent
1852. Mitchell, Rev. Muirhead, 15 St. James's square
1847. M'Neill, William, Glenwhr house, Woolwich
1847. Moffatt, George, M.P., 103 Eaton square
1852. Mogford, Henry, 104 Denbigh street, Pimlico
1851. Monteagle, Lord, F.R.S. 7 Park st., Westminster
1852. Montefiore, Nathaniel, 36 Hyde park gardens
1853. Montizon, Count de, 2 Cranley place, Onslow sq.
1852. Montgomery, James, Brentford
1854. Moody, Rev. Clement, M.A., Vicarage, Newcastle-on-Tyne
1810. Moore, George, F.R.S., 64 Lincoln's inn fields
1847. Moore, John, 105 Goswell road
1829. Morgan, Charles Octavius Swinnerton, M.P., F.R.S., 9 Pall Mall
1852. Morgan, Henry, The Terrace, Sheerness
1843. Morgan, Joseph, Cheetham hill, near Manchester
1852. Moriarty, Edward A., 20 Spring gardens
1853. Moring, Thomas, 44 High Holborn
1820. Morison, James, 57 Upper Harley street
1851. Morley, John, Upper Clapton
1854. Morley, Samuel, Five Houses, Lower Clapton
1848. Morrell, G. F., 149 Fleet street
1852. Morris, David, M.P., 8 St. James's place
1852. Morrison, James, Commercial Bank, Stirling
1822. Morson, Thomas N. R., 38 Queen's sq., Bloomsbury
1843. Mortimer, John, 14 Hanover square
1847. Mortlock, John, 250 Oxford street

1848. Mortlock, William, 18 Regent street
1850. Morton, Francis, James street, Liverpool
1847. Morton, John C., 5 Upper Wellington st., Strand
1853. Moseley, Rev. Henry, M.A., F.R.S., Privy Council Office, Whitehall
1849. Mulready, William, R.A., 1 Linden grove, Bayswater
1849. Munday, George, 26½ Abchurch lane, City
1844. Murchison, J. H., 38 Threadneedle street
1849. Murray, Adam, 35 Craven street, Strand
1853. Murray, Andrew, Royal Dockyard, Portsmouth
1851. Murray, John, 7 Whitehall place
1848. Musgrave, Thomas, 6 Gordon square

1853. Nairne, Robert, M.D., 44 Charles street, Berkeley square
1854. Nash, Eliezer, 30 Coppice row, Clerkenwell
1850. Nash, Swan, 253 Oxford street
1839. Neeld, Joseph, M.P., 6 Grosvenor square
1850. Nesbit, John C., 37 Lower Kennington lane
1853. Nevin, John, Carshield, West Allendale, Haydon bridge
1853. Newall, Henry, Littleborough, Rochdale
1845. Newall, Robert S., Gateshead
1853. Newcastle, the Duke of, P.C., Downing street
1854. Newmarch, George Frederick, Cirencester
1850. Newsome, W., jun., Weybridge common, Surrey
1852. Newton, Charles Henry, 92 Camden road villas
1853. Newton, Henry Charles, 46 Camden road villas
1842. Newton, William Edward, 66 Chancery lane
1851. Nicholay, John Augustus, 82 Oxford street
1854. Nicholon, G. T., Waverley Abbey, Farnham
1854. Nichols, George Alexander, 8 St. George's road, Eccleston square
1849. Nicholl, Donald, A 1 Albany
1851. Nicholl, Henry James, 14 Hyde park gate, Kensington
1854. Nightingale, W., Embley park, near Romsey
1852. Noble, Matthew, Berkeley chambers, 13 Bruton st.
1853. Noldwritt, John Spencer, 11 Albany road, Camberwell
1843. Norfolk, the Duke of, K.G., P.C., F.R.S., Norfolk house, St. James's square, and Arundel Castle, Essex
1853. Norris, Rev. John Pilkington, Privy Council Office, Whitehall
1854. North, Frederick, M.P., Lodge, Hastings
1838. Northesk, the Earl of, Winchester, Hants
1853. Northhouse, W. S., 23 Great Tower street
1814. Northumberland, the Duke of, K.G., P.C., F.R.S., Northumberland house, Charing cross, and Alnwick Castle, Northumberland
1852. Norway, William King, Falmouth
1822. Nurse, William Mountford, 9 Chester place, Regent's park
1851. Nyren, John William, Enfield, Middlesex

1853. Oakes, Henry Porteus, M.P., Oxford and Cambridge Club, Pall Mall
1851. Oakley, S. Jeffryes, 182 Piccadilly
1852. Oakley, Thomas, 31 St. Martin's lane
1852. Oastler, Jonas, Valentine terrace, Blackheath
1853. Oldfield, D., 13 Bouverie street, Fleet street
1850. Oliver, T., Stock Exchange
1852. Oliveira, Benjamin, M.P., F.R.S., 8 Upper Hyde park street
1853. Ord, Augustus W., Abingdon street, Westminster
1821. Orkney, the Earl of, 3 Ennismore place, Prince's gate, Hyde park
1837. Osborne, S. jun., 19 Manor terrace, Brixton
1852. Overbury, Rev. F., Pershore
1848. Overstone, Lord, 2 Carlton gardens
1851. Owen, Capt. Henry Cunliffe, R.E., Army and Navy Club, Pall Mall
1852. Owen, Rev. Joseph Butterworth, Bilston
1848. Oxenford, John, 16 John street, Bedford row

1852. Packe, Charles William, M.P., 7 Richmond terrace, Whitehall
1851. Page, Captain Peter, 33 Thurloe square, Brompton
1848. Page, Thomas, 2 Middle Scotland yard
1853. Paget, Capt. Leopold Grimston, R.A., Christchurch, Hants
1829. Palmer, Philip, 118 St. Martin's lane
1826. Palmer, William Henry, 24 Bedford row
1852. Panton, James, Wareham
1854. Parfit, George John, Bruton, Somersetshire
1852. Parker, John William, West Strand
1854. Parnell, Michael Leopold, 52 Strand
1849. Parry, T. Gambia, Highnam court, Gloucester
1848. Parry, Thomas, Castle Bar Hill, Ealing
1852. Parry, Thomas, Sleaford
1853. Parsons, Percival M. 6 Duke street, Adelphi
1852. Pasley, Lieut.-Gen. Sir Charles William, K.C.B., F.R.S., 12 Norfolk crescent, Hyde park
1852. Pasley, Lieut. C., R.E., Melbourne, S. Australia
1852. Patten, John Wilson, M.P., 24 Hill st., May Fair
1850. Patterson, John, 104 Wood street, Cheapside
1851. Paxton, Sir Joseph, Chatsworth, Derbyshire
1849. Payne, Edward John, 2 Bennet's hill, Birmingham
1853. Payne, George, 2 St. John's place, St. John's hill, Wandsworth
1854. Payne, George Josiah, 328 Regent street
1810. Paynter, John, 64 Coleman street
1853. Peake, Rev. James Room, Whitchurch, Salop
1852. Pearce, Alfred B., 23 Ludgate hill
1852. Pearce, Daniel, 19 St. James's street, Piccadilly
1851. Pedler, George Stanbury, 199 Fleet street
1853. Peel, Sir Robert, Bart., M.P., 22 Princes gate, Hyde park
1847. Pellatt, Apsley, M.P., Holland street, Blackfriars
1853. Penn, John, Greenwich
1847. Pennethorne, James, 7 Whitehall yard
1853. Pepper, John Henry, 8 Regent's park terrace
1821. Pepys, John, 8 Lower Berkeley street
1811. Pepys, W. Hasledine, F.R.S., 11 Earl's terrace, Kensington
1849. Perkins, Ainger March, 6 Francis street, Gray's inn road
1854. Perry, Sir Erskine, M.P., 36 Eaton place
1847. Perry, George, Charter house
1838. Perry, Richard William, 56 Upper Berkeley street, Portman square
1850. Peters, John W., 124 Piccadilly
1852. Petit, Rev. John L., 9 New square, Lincoln's inn
1850. Peto, Samuel Morton, M.P., 9 Great George street, Westminster
1851. Petty, Richard, Royal Hospital, Greenwich
1848. Phillips, Henry, 24 Long Acre
1847. Phillips, Henry Wyndham, 8 George street, Hanover square
1854. Phillips, Capt. Michael, Glenview, Belturbet
1853. Phillips, Robert A., Cockspur street, Haymarket
1853. Phillips, Sir T., Bart., Middle hill, Broadway, Worcestershire
1854. Phillips, Sir Thomas, F.G.S., 11 King's bench walk, Temple
1850. Phillips, William Henry, 16 York place, Camberwell New road
1848. Phillips, W. P., 359 Oxford street
1848. Phipps, Col. the Hon. Charles Beaumont, Windsor Castle
1852. Pickstone, William, Radcliffe bridge, Lancashire
1849. Pierce, William, 5 Jermyn street
1853. Pilkington, James, M.P., Blackburn
1831. Pilgrim, C. H., 6 Upton park, Slough, Bucks
1852. Pinches, Thomas Ryan, 27 Oxendon street
1853. Pinkney, Robert, 26 Long Acre
1850. Piper, Henry Hunt. East Dulwich, Surrey
1854. Pitman, Edward John T., Bristol Road School, Birmingham
1854. Pitts, Samuel, 14 Catherine street, Strand
1852. Platt, James, Hartford Works, Oldham

1846. Platt, John, 22 Park square east, Regent's park
1850. Playfair, Dr. Lyon, C.B., F.R.S., 33 Ladbroke sq., Notting hill
1849. Pledge, Edward Varney, 311 Cheapside, Birmingham
1854. Pocock, George Pearce, Log hall, Bow, Middlesex
1850. Pollock, George, 12 Wood street, Cheapside
1853. Pollock, Henry, 28 George street, Hanover square
1851. Pomeroy, William W., 127 Long Acre
1850. Portal, Wyndham S., Malshanger, Basingstoke, Hants
1812. Portland, the Duke of, P.C., F.R.S., 19 Cavendish square
1852. Portman, Lord, Bryanstone, Blandford, Dorsetshire
1849. Powell, Arthur, Glass Works, Whitefriars
1849. Powell, Nathaniel, Glass Works, Whitefriars
1853. Power, David, the Cloisters, Temple
1847. Powles, John Diston, 46 Wimpole street
1853. Preller, Charles Augustus, Tulse hill, Surrey
1854. Prescott, W. G., F.G.S., 8 Rutland gate
1852. Preston, William, 126 New Bond street
1822. Prior, Edward, 48 York terrace, Regent's park
1848. Prinsep, William Haldimand, 8 Hyde park place west, Hyde park
1825. Prior, William Squire, 23 Broad street bldgs., City
1845. Proctor, John, 18 Cheapside
1819. Provis, William Alexander, The Grange, near Ellesmere, Salop
1854. Pulman, James Heard, House of Lords
1852. Purvis, Prior, M.D., 5 Lansdowne place, Blackheath

1853. Quin, Charles William, 23 King Edward street, Islington

1822. Radcliff, Sir Joseph Bart., Rudding park, Wetherby, Yorkshire
1815. Radnor, the Earl of, F.R.S., Coleshill house, Highworth
1853. Rae, William Fraser, George street, Edinburgh
1852. Raimondi, Willoughby, 23 Surrey street, Strand
1854. Ramsbottom, John, London and North Western Railway, Longsight Works, near Manchester
1854. Ramsden, Sir John William, Bart., M.P., 6 Upper Brook street
1817. Ramsden, Richard, 7 Brook street, Holborn
1833. Rastrick, John Urpeth, F.R.S., Sayes court, near Chertsey, Surrey
1842. Rea, Edward, 115 Wardour street
1852. Roade, Alfred, Datchet
1853. Readwin, Thomas Allison, 50 Beaumont street, Portland place
1850. Redgrave, Alexander, the Home Office, Whitehall
1847. Redgrave, Richard, R.A., Hyde park gate South, Kensington gore
1847. Redgrave, Samuel, Brook house, Chiswick lane, Turnham green
1851. Redpath, Christopher J., St. John's villas, Haverstock hill, Hampstead
1852. Reeve, Henry, Privy Council Office, Whitehall
1851. Reeves, Henry, 113 Cheapside, City
1816. Reeves, John, F.R.S., Clapham
1824. Reeves, John R., F.R.S., King's Arms yard, Moorgate street
1853. Reid, Hugo, 45 Ashburnham grove, Greenwich
1850. Reid, James, 7 Gresham street, City
1847. Reid, William, 25 University street, Tottenham court road
1852. Remnant, Samuel James, Reform Club, Pall Mall
1843. Rendel, James Meadows, F.R.S., 8 Great George street, Westminster
1848. Rennie, Sir John, F.R.S., Whitehall place
1852. Renshaw, George P., Graham's London Hotel, Maxwell street, Glasgow
1823. Reveley, George Johnson, 17 Queen sq., Bloomsbury
1821. Reveley, Henry Willey, Sunny hill, Parkston Poole, Dorset
1823. Reveley, William Austin, 17 Queen sq., Bloomsbury
1853. Reynolds, John S., Hampstead
1853. Reynolds, Capt. H., Twickenham green
1849. Reynolds, T., 45 Devonshire street, Portland place
1847. Ricardo, John Lewis, M.P., 31 Lowndes square
1846. Ricardo, Moses, Brighton
1853. Ricardo, Osman, M.P., 71 Eaton place
1853. Richards, Theophilus, Birmingham
1847. Richardson, Benjamin, Wordsley, near Stourbridge
1847. Richardson, John, Wordsley, near Stourbridge
1854. Riddell, Rev. Thomas, Masham, Yorkshire
1853. Rideout, William, Farnworth, near Bolton
1853. Ridgway, John, Cauldron place, Staffordshire Potteries
1853. Rigg, Rev. Arthur, Chester
1854. Rigg, Richard, 5 Queen's road west, Regent's park
1854. Robartes, James Thomas Agar, M.P., Lanhydrock house, Bodmin
1847. Roberts, David, R.A., 7 Fitzroy street
1852. Roberts, Henry, Downing street
1850. Roberts, John, Upnor lodge, near Rochester
1852. Roberts, William, 28 Evelyn street, Deptford
1854. Robinson, Charles Burt, The Shrubbery, Leicester
1853. Robinson, Frederick, Albert chambers, 20 Pall Mall
1854. Robinson, Henry Oliver, Ripon lodge, near Reading, and 43 Moorgate street
1849. Robinson, Joseph, Berkhampstead
1850. Robinson, Lieut. W. F., R.N., Junior United Service Club
1849. Rock, James, jun., 6 Stratford place, Hastings
1853. Roddam, Jonathan, Newhouse, St. John's Chapel, Weardale
1833. Rofe, John, Winkley square, Preston
1816. Roget, Peter Mark, M.D., F.R.S., 18 Upper Bedford place
1848. Rose, William, Newcastle street, Strand
1850. Roskell, John, jun., Church street, Liverpool
1833. Ross, Andrew, 2 Featherstone buildings, Holborn
1835. Ross, Sir William Charles, R.A., 38 Fitzroy square
1820. Rotch, Benjamin, Lowlands, Harrow, Middlesex
1850. Rothschild, Sir Anthony, Bart., Grosvenor house, Grosvenor place
1854. Roundell, Rev. Henry, Buckingham
1854. Rowden, Rev. G. C., D.C.L., Temple grove, East Sheen
1852. Rowe, Richard Reynolds, Cambridge
1850. Rowland, Alexander William, 20 Hatton garden
1850. Royle, John Forbes, M.D., F.R.S., Heathfield lodge, Acton
1853. Ruff, Edward, Hind court, Fleet street
1854. Rush, G. W., 2 Stanley villas, St. John's wood
1854. Rushout, Col. the Hon. George, M.P., 10 Bolton street, Piccadilly
1854. Rushton, Thomas George Alfred, 50 Portman pl., Maida hill
1853. Rushton, Thomas Lever, Bolton, Lancashire
1854. Russell, Lady Frankland, 15 Cavendish square, and Thickleby park, Yorkshire
1853. Russell, George, 1 Albert villas, Seven Sisters rd., Holloway
1853. Russell, Geo. Fitzjames, 7 Marine parade, Gravesend
1846. Russell, John James, 81 Upper Ground street, Blackfriars
1849. Russell, John Scott, F.R.S., 37 Great George st., Westminster
1854. Ruston, Rev. James, M.A., Benson, Oxon
1849. Rutter, J. O. N., Black Rock, Brighton

1851. Saddington, Alderman J., Gravesend, Kent
1853. St. Davids, the Bishop of, The Palace, Carmarthen
1854. Salisbury, the Dean of, The Close, Salisbury
1854. Salmon, John C., Highworth
1849. Salomons, Aaron, 22 Cambridge square, Hyde pk.
1852. Salomons, David, 3 Cumberland pl., Portman sq.
1854. Sandford, Francis R., Privy Council Office, Whitehall
1852. Salt, Titus, Bradford, Yorkshire

1852. Sampson, Samuel, Sellers hall, Church end, Finchley
1850. Samuel, James, 26 Gt. George street, Westminster
1852. Sanctuary, Thomas, Horsham, Sussex
1849. Saunders, James Ebenezer, jun., 9 Finsbury circus
1842. Saunders, William Wilson, East Hill, Wandsworth
1848. Saward, Michael, 9 Chatham place, Blackfriars
1854. Saye and Sele, the Rev. Lord, Broughton Castle, near Banbury, Oxon
1854. Sayer, Edward, 9 Clifford street, Bond street
1851. Saynor, Samuel, Grosvenor park, Camberwell
1853. Scalia, L., 4 Wyndham place
1853. Scamell, George, Melrose lodge, Holloway
1845. Schneider, Richard, 3 Circus road, St. John's wd.
1852. Scholer, William, Stockwell common
1850. Scholefield, W. Freer, Hollin hall, Ripon
1854. Sclater, George, Hoddington house, Odiham
1852. Scoones, Major Edward, Tunbridge
1854. Scott, Abraham Charles, 24 Ely place, Holborn
1852. Scott, George Walter, 7 Lothbury
1816. Scott, Henry Dundas, 10 Eccleston street, Pimlico
1847. Scott, Henry E., 11 Holland st., Kensington
1853. Scott, James, 1 Eccleston street, Chester square
1851. Scott, John, 9 Paternoster row
1847. Scott, J. Anthony, 13 Pall Mall East
1852. Scott, Michael, 26 Great George st., Westminster
1854. Scott, Thomas, 5 Charing cross
1851. Sedgwick, John Bell, 1 St. Andrew's place, Regent's park
1851. Sedgwick, William, 5 Regent street
1851. Sells, Edward Perronet, 55 Bankside
1825. Sex, Edward, Stock Exchange
1853. Seymour, Henry Danby, M.P., Knoyle house, Hindon, Wilts, and 39 Upper Grosvenor street
1816. Seymour, William, 1 Dorset gardens, Brighton
1847. Sharpe, Edmund, 2 Devonshire terrace, High street, Marylebone
1852. Sharpe, Edmund, M.A., Lancaster
1850. Shattock, H. Foster, Nunhead rd., Peckham, Surrey
1806. Shears, David T., Bankside
1852. Shepard, J., Halifax
1851. Shepherd, Charles, 53 Leadenhall street, City
1850. Shepherd, Charles, jun., 53 Leadenhall st., City
1843. Sheppard, Richard, Newport Pagnell
1851. Sheridan, Henry Brinsley, 32 Ludgate hill
1847. Sheriff, G. W., 61 Friday street
1853. Sheriff, John William, Ridgway hill, Wimbledon
1851. Shillito, George, Manor park, Streatham, Surrey
1853. Shoolbred, James, jun., The Elms, Acton
1811. Shore, Offley, Church Dale, Ashford, Derbyshire
1808. Shuter, T. Allen, Hooley house, Colsdan, Surrey
1812. Sich, Henry, Chiswick
1850. Sich, Henry Wyndham, Chiswick
1852. Sich, Thomas, Chiswick
1851. Sidney, Samuel, Percy vale, Forest hill
1849. Siemens, Charles William, 7 John st., Adelphi
1854. Sier, Rev. Thomas, D.C.L., Ravensden, Bedfordshire
1854. Silk, George Charles, 79 Pall Mall
1852. Sillifant, John, Coombe, near Crediton
1848. Silverlock, H., 3 Wardrobe terrace, Doctor's Coms.
1851. Sim, John C. 9 Clifton place, Hyde park gardens
1853. Simmons, Capt. John Lintorn Arabin, R.E., Board of Trade
1854. Simon, John, F.R.S., 37a Upper Grosvenor street
1854. Simms, William Hawes, 9 Thurloe place, Old Brompton
1843. Simpson, James, 29 Great George street, Westminster
1854. Simpson, Robert, Moor house, Ryton, Newcastle-on-Tyne
1853. Simpson, William, 2 Eccleston street, Chester sq.
1843. Simpson. William Butler, 456 Strand
1848. Skeat, Wm., 6 Park place villas, Maida hill West
1853. Skey, F. Carpenter, M.D., 9 Hertford st. May fair
1853. Slaney, R. A., Shrewsbury, and 5 Bolton row, May fair
1854. Slee, Charles W., 58 Doughty st., and 6 Newgate st.
1816. Smart, Sir George, 91 Great Portland street
1852. Smart, George, Cardiff
1852. Smee, Alfred, F.R.S., Finsbury circus
1851. Smee, William Alfred, Finsbury pavement
1846. Smirke, Edward, 79 Grosvenor street
1847. Smirke, Sidney, A.R.A., 79 Grosvenor street
1845. Smith, Benjamin, Bugbrook, near Weedon
1851. Smith, Charles, Church house, 14 Churchyard row, Newington Butts
1814. Smith, Charles H., 29 Clipstone street
1852. Smith, Rev. Charles Lesingham, Little Canfield Rectory, Dunmow, Essex
1851. Smith, Edward Osborne, 24a Bryanstone square
1851. Smith, Francis, 26 Southampton street, Strand
1843. Smith, George, 4 Frederick place, Old Jewry
1847. Smith, George, 65 Cornhill
1849. Smith, George, 29 Finsbury square
1852. Smith, Henry Lilley, Southam
1815. Smith, James Scott, Distillery, Whitechapel
1850. Smith, John, 49 Long Acre
1852. Smith, John, Malton
1854. Smith, John, 8 Upper Fountain place, City road
1852. Smith, Rev. J. H., Leamington
1847. Smith, John Jobson, Roscoe place, Sheffield.
1850. Smith, Richard, Priory, Dudley
1809. Smith, Robert Peter, Paris
1852. Smith, Samuel, Field house, Horton, Bradford, York
1852. Smith, William, 37 Tavistock square
1847. Smith, William, 10 Salisbury street, Strand
1849. Smith, William Henry, 40 Great Ormond street
1850. Smith, William Henry, 136 Strand
1853. Smith, William Henry, 8 Upper Fountain place, City road
1852. Smith, William Wyke, Barnet
1852. Smithies, Joseph J., 14 Compton street East, Brunswick square
1853. Snell, Edward, 14 City road
1851. Soames, James, May's buildings, St. Martin's lane
1835. Solly, James, Tipton, near Birmingham
1853. Solly, Richard, Sheffield
1804. Solly, Richard Horsman, F.R.S., 48 Great Ormond street
1828. Solly, Samuel Reynolds, F.R.S., Serge hill, near King's Langley, Herts
1837. Solly, William Hammond, Bloxworth Rectory, Blandford, Dorsetshire
1845. Sopwith, Thomas, F.R.S., Allenheads, Haydon-bridge
1854. Sorrell, William, Eli street, Kingsland road
1853. Soward, John, 241 Tottenham court road
1852. Sparkes, William, Crewkerne
1851. Spicer, Henry, 22 Crescent, Highbury
1854. Spicer, William Revel, 19 New Bridge street, Blackfriars
1848. Spiers, Richard James, Oxford
1853. Spottiswoode, George, New street square
1852. Spurrell, Flaxman, Bexley heath
1852. Squire, William, 54 Camden square, Camden town
1853. Stafford, Marquis of, M.P., 2 Hamilton pl. Piccadilly
1852. Standen, William, B.D., 48 Brompton crescent
1853. Standring, Benjamin, jun., Forest hill, and 152 Minories
1827. Stanhope, the Earl of, 29b Albemarle street
1853. Staniland, William, Selby, Yorkshire
1853. Stanley, Lord, M.P., Knowsley, Lancashire, and Albany, Piccadilly
1853. Stansbury, Charles Frederick, A.M., 7 Cornhill
1852. Stansfeld, James, Halifax
1802. Stapylton, M., Myton hall, Boroughbridge
1852. Starkie, Richard Stringer, 4 Strand
1851. Startin, James, M.D., 3 Saville row
1824. Staunton, Michael, 9 Strand
1838. Staunton, William Sandys, 9 Strand
1854. Stephens, Francis, 36 Great Winchester street
1852. Stephens, Henry, 34 Stamford street

1851. Stephens, J. P. D., Colney Hatch, Middlesex
1852 Stephens, William, Maidenhead
1851. Stephenson, Henry Palfrey, Thurloe place West, Brompton
1842. Stephenson, Robert, M.P., F.R.S., 24 Great George street, Westminster
1851. Stirling, Thomas, Belvidere wharf, Belvidere road, Lambeth
1851. Stirling, Thomas, jun., Belvidere wharf, Belvidere road, Lambeth
1852. Stirton, George James, 13 Beaufort builds., Strand
1852. Stohwasser, Joseph, 39 Conduit street
1851. Stone, John, LL.D., Summer Hill School, near Bristol
1851. Stones, William, 10 Queenhithe, City
1852. Storey, Thomas, Lancaster
1816. Storey, William John Clayton, 12 Marlborough place, St. John's wood
1854. Street, William Fauntleroy, 16 Finchley New road, St. John's wood
1852. Strong, Rev. William, Peterborough
1832. Strutt, Right Hon. Edward, M.P., 42 South street, Grosvenor square
1852. Stubbs, Thomas Edward, 15 Northampton park, Islington
1833. Sutherland, the Duke of, K.G., Stafford house, St. James's
1851. Sutton, Henry, 30 Sackville street, Piccadilly
1800. Sutton, Robert, care of Rev. R. R. Baker, 5 Magdalen row, Great Prescott street
1852. Swinburne, W. A., 93 Upper Thames street
1852. Swindells, George, Bollington, near Macclesfield
1848. Symonds, Arthur, 6 Adelphi terrace
1851. Symons, Elias Octavius, 3 Exeter st., Sloane st.

1848. Taber, John, Herne hill, Dulwich
1852. Tait, Robert Scott, 5 Queen Anne street
1852. Tancred, John William, Grove house, South street, Greenwich
1845. Tanqueray, Charles, Vine street, Bloomsbury
1853. Tapp, William Berrett, Hertford
1852. Tartt, William Macdowel, Cheltenham
1850. Tassie, Wm., 8 Upper Phillimore pl., Kensington
1852. Taylor, George, Horton lane, Bradford
1800. Taylor, John, 11 St. George's place, Knightsbridge
1851. Taylor, John, Burnfoot house, Wigton, Cumberland
1846. Taylor, John, jun., 6 Queen's place, Southwark bridge
1839. Taylor, John, jun., 22 Parliament street
1850. Taylor, William, Newport Pagnell
1846. Tennant, James, 149 Strand
1845. Terni, Vito, 3 Crown court, City
1852. Teulon, Samuel Saunders, Lansdowne place, Brunswick square
1854. Thimbleby, John, Spilsby, Lincolnshire
1851. Thistlethwayte, Henry F., 48 Cadogan place, Belgrave square
1853. Thomas, Francis B., 153 New Bond street
1850. Thomas, George, 68 Strand
1853. Thomas, John William, 153 New Bond street
1847. Thompson, John, 1 Campden hill terrace, Kensington
1849. Thomson, Adam, 25 New Bond street
1852. Thompson, Henry, Clitheroe
1849. Thornton, George, the Grange, Gargrave, Skipton
1849. Thornton, George Thomas, the Grange, Gargrave, Skipton
1851. Thurston, Charles Bosworth, 9 Southampton street, Bloomsbury
1851. Tierney, James Barracliffe, Horseley Works, Tipton
1850. Till, Richard, Guildhall buildings, City
1853. Tinker, Frederick, Hyde, near Manchester
1844. Tite, William, F.R.S., 42 Lowndes square
1850. Tomlinson, Rev. J. P., Sherfield Rectory, Romsey, Hants
1850. Tomkins, Edward, 19 Fleet street
1802. Tooke, William, F.R.S., 12 Russell square
1835. Tooke, Arthur William, jun., 39 Bedford row, and Pinner hill, near Watford, Herts
1838. Topham, Charles, Eagle Wharf road, New North road
1853. Topham, James Tell, Loughborough rd., Brixton
1853. Towers, George Augustus, Hertford
1853. Towneley, Charles, M.P., Towneley park, Burnley
1853. Travers, John Ingram, 19 St. Swithin's lane
1852. Trent, Edwin Ward, Old Ford
1852. Trevelyan, Arthur, Tyneholme, Pencaithland, N.B.
1852. Trevelyan, Sir Walter Calverley, Wallington, near Morpeth
1854. Tripp, James S., Kew green
1849. Tuck, J. H., 22 Pall Mall
1851. Tucker, Henry, Stamford Hill
1852. Tudor, Edward Owen, 46 Westbourne terrace
1852. Tudor, Edward Scripps, Bromley, Middlesex
1853. Tufnell, Edward Carleton, 26 Lowndes square
1842. Tulloch, James, F.R.S., 16 Montague place, Russell square
1851. Turnley, Joseph, 19 Bedford place, Russell square
1854. Turner, Richard, Hammersmith Iron Works, Dublin
1853. Turrell, H. Stein, Brighton
1852. Tuxford, George Parker, 246 Strand, and Elm Bank house, Barnes, Surrey
1848. Twining, Henry, Grove house, Clapham common
1817. Twining, Richard, F.R.S., 13 Bedford pl., Russell square
1853. Twining, Samuel Harvey, 215 Strand
1847. Twining, Thomas, jun., Perryn house, Twickenham
1851. Tyler, George, 24 Upper Holloway place, Holloway
1852. Tyssen, J. R. D., Manor house, Hackney

1849. Urling, George Frederick, 224 Regent street
1820. Uwins, Thomas, R.A., Victoria road, Kensington
1853. Uzielli, Matthew, Hanover lodge, Regent's park

1852. Vane, Rev. John, 29 Cambridge street, Hyde park
1814. Varley, Cornelius, 1 Charles st., Clarendon square
1851. Varley, Cornelius John, 1 Charles street, Clarendon square
1842. Varty, Thomas, 31 Strand
1853. Vaughan, Charles John, D.D., Harrow
1853. Vaughan, David James, M.A., 26 Princess street, Leicester
1848. Vaughan, George, 88 Westbourne ter., Hyde park
1848. Veitch, James, M.D., 6 Ovington square, Brompton
1850. Vickers, William, Manchester
1850. Vignoles, Charles, Duke street, Westminster
1849. Vivian, B. T., Breage, Helston, Cornwall

1853. Wade, I. M., 45 Lincoln's inn fields
1848. Waite, Henry, Rose hill, Dorking
1849. Wakefield, Joseph Colen, 20 Friday street, City
1852. Wales, the Rev. Chancellor, Northampton
1853. Walenn, William Henry, 7 Duke street, Adelphi
1849. Waley, Solomon W., 22 Devonshire place
1852. Walker, Frederick, Harleyford place, Kennington
1821. Walker, James, F.R.S., 23 Great George street, Westminster
1854. Walker, Major James Scott, Junior United Service Club
1853. Walker, Robert, 40 King William street, London bridge
1852. Wallace, Joseph, Portaferry
1853. Wallis, Thomas Henry, 64 Long Acre
1853. Walmsley, Sir Joshua, M.P., 101 Westbourne terrace
1852. Walpole, Major John, R.E., Junior United Service Club
1852. Walters, Rev. Charles, M.A., Winchester
1853. Walters, Frederick, 16 Moorgate street
1851. Wampen, Henry, 91 Upper Ebury street, Pimlico
1853. Ward, Lord, Dudley house, Park lane

1853. Ward, Capt. E. Wolstenholme, R.E., Sydney, New South Wales
1810. Ward, William, A 3 Albany, Piccadilly
1852. Warner, Charles Barham, 8 Crescent, Jewin street
1849. Warren, A., The Grove, Kentish town
1853. Warren, Joseph, Loxdale, Market Drayton
1847. Warriner, Henry, Bloxham grove, near Banbury, Oxon
1849. Wass, Charles W. 6 Marlborough place, St. John's wood
1849. Waterhouse, A., 1 St. Paul's churchyard
1852. Waterhouse, Samuel, Halifax
1851. Watherston, J. H., 16 Henrietta street, Covent garden
1852. Watson, J. J. W. Ph. D., Gloucester place, Old Kent road
1820. Watson, J. Webster, Latymer lodge, Hammersmith
1850. Watts, Francis, 1 Warwick square, Belgrave road
1853. Way, Major, R.A., 27 Montagu square
1853. Webb, Henry Bellamy, Messrs. Baring Brothers & Co., India buildings, Liverpool
1845. Webb, Edward Burtinshaw, Derby sq., Rock ferry, Birkenhead
1847. Webb, John, 11 Grafton street
1851. Webber, John, 31 Milk street, Cheapside
1853. Webster, Frederick, 38 Weymouth street, Portland place
1851. Webster, R., 74 Cornhill
1838. Webster, Thomas, F.R.S., 2 Great George street, Westminster
1853. Weddell, George, 3 York place, Kentish town
1838. Weedon, Thomas, 41 Hart street, Bloomsbury
1851. Weir, Edward, 16 Bath place, New road
1825. Wells, Jonah Smith, Carpedens, near Watford, Herts
1853. Wells, William, M.P., Haveland, Norwich
1849. Westall, Richard, 115 Lower Thames street
1853. Westall, William Mawley, Love lane, Aldermanbury
1853. Westbrook, Andrew, Freeman's court, Cheapside
1851. Westhead, Joshua Proctor Brown, Lea Castle, near Kidderminster
1841. Westley, William, 24 Regent street
1853. Westminster, the Marquis of, P.C., 33 Upper Grosvenor street
1853. Wharncliffe, Lord, 45 Lower Grosvenor street
1847. Whatman, James, M.P., F.R.S., Vinters, Maidstone
1853. White, John, Cowes, Isle of Wight
1853. White, John Francis, 30 Hunter street, Brunswick square
1847. Whishaw, Francis, Sandown, Isle of Wight
1843. Whishaw, Henry, 3 Gray's inn square
1843. White, George Frederick, Millbank street
1852. White, Joseph Pugh, Shrewsbury
1852. Whitfield, Henry, Ashford, Kent
1852. Whiting, John, M.D., Grove villa, Tunbridge Wells
1852. Whitmore, George, 63 Park st., Grosvenor square
1854. Whitwell, John, Kendal, Westmoreland
1844. Whitworth, Joseph, Chorlton street, Manchester
1847. Whittingham, Charles, Took's court, Chancery lane
1850. Whytehead, William Keld, Lovell's court, Paternoster row
1821. Wigg, Francis, 7 Bedford row
1831. Wigg, George, 61 Westbourne terrace, Hyde park
1850. Wild, Charles Kemp, 113 Cheapside
1851. Wild, Henry Bowles, 113 Cheapside
1816. Wild, John, 7 Martin's lane, Cannon street
1821. Wildman, Col. Thomas, Newstead Abbey, Notts
1848. Wilkins, William Crane, 24 Long Acre
1850. Wilkinson, Henry, 27 Pall Mall
1853. Wilkinson, John, Gledhow Mount, Leeds
1853. Wilkinson, Joseph, 31 St. George's road, Borough
1852. Wilkinson, Josiah, Southampton lodge, Highgate
1854. Wilkinson, Samuel, Stockport
1847. Wilkinson, William Arthur, M.P., Beckenham, Kent
1849. Wilks, John, 3 Finsbury square
1847. Wilks, Joseph, 3 Harley place
1852. Willats, Richard, 28 Ironmonger lane, Cheapside
1853. Williams, Charles Croft, Roath Court, near Cardiff
1854. Williams, Charles Wye, Dublin Steam Packet Company, Liverpool
1848. Williams, F. W., 6 Rood lane, City
1852. Williams, James, 18 Westgate buildings, Bath
1852. Williams, John, 13 Gresham street, City
1852. Williams, R., 62 Strand
1836. Willich, Charles M., 24 Suffolk street, Pall Mall East
1853. Wills, William Henry, 12 Camden square
1810. Wilson, Charles Algernon, Gawler place, Adelaide, S. Australia
1847. Wilson, Edward, 1 Albion place, Blackfriars
1842. Wilson, Edward Brown, Leeds
1854. Wilson, Frederick J., 32 Cadogan place, Chelsea
1845. Wilson, George Frederick, Wandsworth
1854. Wilson, Isaac, Middlesborough
1850. Wilson, James Holbert, 19 Onslow sq., Brompton
1851. Wilson, John, Heath Lodge, Iver, Bucks
1853. Wilson, John Robert, 10 Wellington st., Bedford
1818. Wilson, Lestock Peach, 11 King's yard, Moorgate street
1853. Wilson, Alderman Richard, Victoria house, Bramley, near Leeds
1842. Wilson, Robert, Copthall buildings, Bank
1854. Wilson, Alderman Samuel, Beckenham, Kent
1810. Wilson, Thomas, Gawler place, Adelaide, South Australia
1852. Wilton, the Earl of, Grosvenor square
1854. Winchester, the Bishop of, 19 St. James's square
1853. Winchester, William Henry, F.R.C.S., 14 Westbourne terrace road
1853. Window, Frederick Richard, 8 Craig's court, Charing cross
1852. Wing, William, 163 New Bond street
1854. Wingfield, John, 2 Devonshire pl., Haverstock hill
1822. Winkworth, Thomas, 7 Sussex place, Canonbury
1823. Winsor, Frederick Albert, 57 Lincoln's inn fields
1853. Winstone, Benjamin, 7 Ely place, Holborn
1850. Winter, G. jun., Bankside
1849. Wire, David William, 9 St. Swithin's lane, City
1849. Wodderspoon, James, 17 Portugal st., Lincoln's inn
1848. Wolff, Zave, 23 Church street, Spitalfields
1844. Womersley, C. J., Hastings
1850. Wood, Edward George, 123 Newgate street
1848. Wood, C. H. L., Hillfield, Hampstead
1852. Wood, Rev. Sir John Page, Bart., Cressing, Braintree, Essex
1845. Woodcroft, Bennet, 3 Furnival's inn
1854. Woodd, Basil Thomas, M.P., 14 Great Cumberland street, Hyde park
1850. Woodd, Robert Ballard, Devonshire pl., Hampstead
1854. Woodrooffe, Rev. Thomas, Winchester
1853. Woods, Edward, 34 Great George street, Westminster
1854. Woollcoombe, Thomas, Devonport
1853. Woolmer, Shirley Foster, 11 Chancery lane
1854. Wovendon, Joseph, 71 Market street, Manchester
1851. Wray, George Woodstock, Greenhithe, Kent
1854. Wrey, John William, Stoberry park, Wells, Somerset
1852. Wright, Caleb, Tyldesley
1849. Wright, John, Upnor, near Rochester
1852. Wright, John, Noel street, Soho
1853. Wright, Thomas Cook, 18 Upper Gower street
1852. Wrightson, William Battie, M.P., 22 Upper Brook street
1852. Wyatt, Alfred, Grosvenor square
1852. Wyatt, Matthew Digby, 54 Guilford st., Russell sq.
1853. Wylde, R. G., 11 Eaton place south
1851. Wyndham, Edward, 14 Blandford square
1852. Wyon, Leonard, 22 Bloomfield road, Maida hill

1851. Xenos, Stefanos, 19 London street, Fenchurch st.

1851. Yapp, George Wagstaff, 17 Cornhill
1849. Yarborough, the Earl of, 16 Arlington street, Piccadilly
1813. Yarrell, William, 6 Little Ryder st., St. James's
1849. Yarrow, Thomas A., 89 St. James's street
1851. Yeates, Andrew, 12 Brighton place, New Kent road
1853. Yeats, John, F.R.G.S., the Middle School, Peckham
1850. Yeldham, Stephen, 9 Stamford street, Blackfriars
1843. Yewd, William, 30 East st., Lamb's Conduit st.
1844. Yool, Henry, 17 Harewood square
1853. Young, George, Leeds
1850. Young, William Ogsden, 12 Victoria rd., Kensington
1853. Yssai, Manuel de, Club chambers, Regent street

1853. Zetland, the Earl of, Upleatham, Redcar, Yorkshire

NOTICE.

It is particularly requested that every Change of Residence may be communicated to the Secretary without delay.

LIST OF INSTITUTIONS IN UNION.

N.B.—In the following List the Institutions which have agreed to a General Interchange of Privileges are denoted by an asterisk. By means of this organisation and arrangement a Member of one Institution, when visiting a town in which any other is situated, will be enabled to enjoy at that other, for the time being, all the advantages of membership. Any person wishing to avail himself of this privilege, needs only to present his Card of Membership, it being understood that he will abide by the Bye-Laws of the particular Institution he may visit, as well in regard to the time to which this privilege may be extended as to all other matters.

*ABERDEEN, Mechanics' Institution
Aberystwith, Literary, Scientific and Mechanics' Institution
*Accrington, Mechanics' Institution
*Allenheads, (near Haydon Bridge,) Library and News-room
Alton, Mechanics' Institution
Andover, Hants and Wilts Educational Society
,, Library and Institute
Annan, Mechanics' Institute
*Ashbourn, Reading Room and Literary Institute
*Ashford, Mechanics' Institute
Ashton and Dukinfield, Mechanics' Institution
*Aylesbury, Mechanics' Institution

*Bacup, Mechanics' Institution
Bakewell and High Peak, Institute
*Banbury, Mechanics' Institute
*Barking, Mutual Improvement Society
*Barnet, Institute
*Barnsley, Mechanics' Institute and Literary Society
*Barnstaple, Literary and Scientific Institution
*Barrhead (near Glasgow,) Mechanics' Institution
*Basingstoke, Mechanics' Institute
*Bath, Athenæum
* ,, Commercial and Literary Institution
*Battersea, Literary and Scientific Institution
Battle, Mechanics' Institution
*Beccles, Public Library and Scientific Institution
*Bedford, Literary and Scientific Institution
Belfast, Working Classes Association
Belturbet, Literary and Scientific Society
Berkhampstead, Mechanics' Institution
*Bexley Heath, Society for the Promotion of Useful Knowledge
*Bicester, Literary Institution and Mutual Improvement Society
*Bilston, Institute
Birmingham, Polytechnic Institution
*Bishop Stortford, Literary Institution
Blackburn, Bank Foundry and Highfield Mill Athenæum
Blairgowrie and Rattray, Mechanics' Institution
Blandford, Institution
*Bodmin, Literary Institution
Bolton, Mechanics' Institution
*Boston, Athenæum
Bradford (Wilts), Literary Institution
Bradford (Yorkshire), Mechanics' Institute.
*Braintree and Bocking, Literary and Mechanics' Institution
Bramley, Mechanics' Institute
Brechin, Mechanics' Institution
Brentford, Literary and Scientific Institution
Bridgend, Mechanics' Institute
*Bridgwater, Literary and Scientific Institution
Brighton, Athenæum and Young Men's Literary Union
,, London, Brighton and South Coast Railway Literary and Scientific Institution
* ,, Mechanics' Institution
,, Royal Literary and Scientific Institution
*Bristol, Athenæum
,, Early Closing Association, (Education Department)
*Bromley, Literary Institute
*Bromsgrove, Literary and Scientific Institution
Buckingham, Literary and Scientific Institution
*Buntingford, Literary Institute
*Burnley, Mechanics' Institution
*Bury, Athenæum
Bury St. Edmunds, Athenæum and Suffolk Institute of Archæology and Natural History
* ,, Mechanics', Literary and Scientific Institution

*Calne, Literary Institution
Cambo (near Morpeth), Subscription Library
*Cambridge, Philo-Union Literary Society
*Cambridge and Cambridgeshire, Mechanics' Institute
*Cardiff, Athenæum
*Carlisle, Literary, Scientific and Mechanical Institution
*Carmarthen, Literary and Scientific Institution
*Chatham, Rochester, Stroud, and Brompton, Mechanics' Institution
*Cheadle (Staffordshire), Mechanics' Institution and News-room
Chelmsford, Literary and Mechanics' Institution
Cheltenham, Literary and Philosophical Institution
*Chepstow, Literary Institution
*Chester, Mechanics' Institution
Chesterfield and Brampton, Mechanics' Institute
*Chichester, Literary Society and Mechanics' Institution
Chippenham, Literary and Scientific Institution
*Cirencester, Literary, Scientific and Mechanics' Institution
,, Permanent Library
Clitheroe, Mechanics' Institute
Coalbrookdale, Literary and Scientific Institution
*Coalcleugh, (near West Allendale,) Library and News-room
Coggeshall, Literary and Mechanics' Institute
Colchester, Mechanics' Institution
*Corfe Castle, Mutual Improvement Society
Cork, Royal Institution
Coventry, Mechanics' Institution
Crewkerne, Literary and Scientific Institution

*Crieff, Mechanics' Institution
Croydon, Literary and Scientific Institution
*Cupar Angus, Society for Mutual Improvement

*Darlington, Mechanics' Institution
*Dawlish, Literary and General Knowledge Society
Dedham, (near Colchester), Literary Institution
*Denton and Haughton, Mechanics' and Literary Institute
*Deptford, Institution
*Derby, Mechanics' Institution
,, Railway Literary Institution
*Devizes, Literary and Scientific Institution
*Devonport, Mechanics' Institute
*Dover, Museum and Philosophical Institution
Downpatrick, Mechanics' Institute
Dublin, Statistical Society*
*Dudley, Mechanics' Institution
*Dumfries and Maxweltown, Mechanics' Institution
Dundalk, Literary and Scientific Institution
*Dunmow, (Essex), Literary and Scientific Institution
*Durham, Mechanics' Institute
Dursley, Young Men's Society

*Eastbourne, Literary Institute
East Dereham, Institute for Moral and Intellectual Improvement
East Retford, Literary and Scientific Institution
Ely, Mechanics' Institution
*Epsom and Ewell, Literary and Scientific Institution
*Exeter, Literary Society

Falkirk, School of Arts
*Falmouth, Mechanics' Institute
*Farnham, Mechanics' Institution
Feversham, Literary and Scientific Institution
*Folkstone, Harveian Institution
*Fordingbridge, Literary, Scientific and Mechanics' Institute

*Gainsborough, Literary, Scientific and Mechanics' Institution
*Galway, Royal Institution
*Gateshead, Mechanics' Institute
,, Washington Chemical Works, Reading Institution and Library
*Glasgow, Athenæum
* ,, Mechanics' Institution
Gloucester, Literary and Scientific Society
Grantham, Philosophical Institution
* ,, Public Literary Institution
Gravesend and Milton, Mechanics' Institute
Greenside, (Ryton, Newcastle-on-Tyne,) Library
*Greenwich, Society for the Acquisition and Diffusion of Useful Knowledge
Guernsey, Mechanics' Institution and Literary Society
*Guilford, Institute

*Hailsham, Mutual Improvement Society
*Halifax, Mechanics' Institution and Mutual Improvement Society
*Halstead, Mechanics', Literary and Scientific Institute
Hampton (Middlesex), Literary Society
Hartlepool (West), Literary and Mechanics' Institution
*Hastings, Mechanics' Institution
Hereford, Permanent Library
* ,, Philosophical, Antiquarian and Literary Society
Hertford, Literary and Scientific Institution
* ,, Mutual Instruction Society
Hexham, Mechanics', Literary and Scientific Institution
High Green (near Sheffield), Mechanics' Institution
*Highgate, Literary and Scientific Institution
Highworth, Literary and Scientific Institution
Hitchin, Mechanics' Institution
*Holmfirth, Mechanics' Institution
*Horncastle, Mechanics' Institution
*Horsham, Literary and Scientific Institution

Huddersfield, Mechanics' Institution
,, Philosophical Society
Hull, Mechanics' Institution
*Huntingdon, Literary and Scientific Institution
Hyde, (near Manchester) Mechanics' Institution
Hythe, Reading Society

Ipswich, Mechanics' Institution

Kelvedon, Literary Institution
Kendal, Mechanics' Institution
King's Lynn, Free Library
Kingston-on-Thames, Mechanics', Literary and Scientific Institution

Lancaster, Athenæum
* ,, Church of England Instruction Society
* ,, Mechanics' Institute
*Launceston, Mechanics' Institute
*Leamington, Royal Literary and Scientific Institution
Leeds, Mechanics' Institution and Literary Society
,, Philosophical and Literary Society
,, Yorkshire Union of Mechanics' Institutes
Leek, Mechanics' Institution
*Lees, (near Manchester,) Literary and Scientific Institution
*Leicester, Mechanics' Institution
*Leiston (near Saxmundham), Mechanics' Institute
*Leven, Vale of, (Dumbartonshire,) Mechanics' Institution
*Lewes, Mechanics' Institution
Limerick, Institution
,, Literary and Scientific Society
Lincoln and Lincolnshire, Mechanics' Institution
Linton, (Cambridgeshire) Literary Institution
*Liskeard, Institution
*Liverpool, Bootle Educational Institution
,, Collegiate Institution
* ,, Mechanics' Institution
Llanelly, Mechanics' Institution
London, Bank of England Library and Literary Association
London, Beaumont Philosophical Institution
* ,, Camberwell Institute for the Industrial Classes
,, Camberwell Literary and Scientific Institution
* ,, Clapham Literary and Scientific Institution
,, Crosby Hall Evening Classes for Young Men
* ,, Hackney Literary and Scientific Institution
* ,, Jews' and General Literary and Scientific Institution
* ,, Kingsland, Dalston, and De Beauvoir Town, Literary and Scientific Institution
,, London and South-Western Literary and Scientific Institution
* ,, London Domestic Mission Society
* ,, London Mechanics' Institution
,, Marylebone Literary and Scientific Institution
,, North-West London Christian Literary Institute
,, St. George's, Hanover-square, Lending Library and Reading Rooms
,, St. John's Wood, Literary and Scientific Institution
* ,, Pimlico, Literary, Scientific and Mechanics' Institution
,, Walworth Literary and Scientific Institution
* ,, Westminster Literary, Scientific and Mechanics Institution
*Longton, Athenæum and Mechanics' Institution
*Loughborough, Literary and Philosophical Society
*Louth, Mechanics' Institution
*Ludlow, Literary Association and Mechanics' Institute
*Lymington, Literary Institution
*Lynn, Conversazione and Society of Arts

*Macclesfield, Society for the Acquirement of Useful Knowledge
*Maidenhead, Mechanics', Literary and Scientific Institution

*Maldon, Literary and Mechanics Institute
Malton, Literary Institute
Manchester, Institutional Association of the Literary and Mechanics' Institutions of Lancashire and Cheshire
* ,, Mechanics' Institution
*Manningtree and Mistley, Mechanics' Institution
*Margate, Literary and Scientific Institution
*Market Drayton, Society for the Acquirement of Useful Knowledge
*Marlborough, Reading and Mutual Improvement Society
Masham, (Yorkshire), Mechanics' Institution and Literary Society
Middlesborough, Mechanics' Institute
*Modbury (near Ermebridge), Institution
Morpeth, Mechanical and Scientific Institution

Nailsworth, Literary and Mechanics' Institute
Newark, Mechanics' Institution
*Newbury, Literary Institution
Newcastle-on-Tyne, Church of England Institute
,, Northern Union of Literary and Mechanics' Institutions
*Newhouse (near St. John's, Weardale), Library and News-room
*Newport (Isle of Wight), Athenæum and Mechanics' Institution
*Newport (Monmouthshire), Athenæum and Mechanics' Institute
*Newport (Salop), Mechanics' Institute and Literary Society
Northallerton, Institute
*Northampton and Northamptonshire, Mechanics' Institute
* ,, Religious and Useful Knowledge Society
Norwich, Literary Institution
*Norwich, Young Men's Institute
Norwood, Library and Reading Room
*Nottingham, Mechanics' Institution

Odiham, Mechanics' Institution
*Oldham, Lyceum
Oswestry, Young Men's Institute

*Patricroft (near Manchester), Mechanics' Institution
Pembroke Dock, Mechanics' Institute
*Pendleton (near Manchester), Mechanics' Institution
*Penzance, Institute
*Pershore, Mechanics' Institution
*Peterborough, Mechanics' Institution
*Plymouth, Mechanics' Institute
Poole, Mechanics' Institute
* ,, Town and County Library and Literary Institute
Portaferry, Mechanics' Institute
Portsea, Watt Institute
*Portsmouth and Portsea, Literary and Philosophical Society
*Preston, Institution for the Diffusion of Knowledge
,, Literary and Philosophical Institution

*Radcliffe Bridge and Pilkington, Lyceum and Mutual Improvement Society
*Rawtenstall, Mechanics' Institution
*Reading, Literary, Scientific and Mechanics' Institution
*Redditch, Literary and Scientific Institute
Redruth, Institution for the Promotion of Useful Knowledge
*Reigate, Mechanics' Institution
Repton, Institute
*Romford, Literary and Mechanics' Institution
*Royston, Mechanics' Institute
Ryde (Isle of Wight), Literary and Scientific Institute

*Saffron Walden, Literary and Scientific Institution
St. Austell, Literary Institution
*St. Ives (Cornwall), Institution
*St. Just (near Penzance), Institution
*St. Leonard's, Mechanics' Institution
Salford, Mechanics' Institution
*Salisbury, Literary and Scientific Institution
*Saltash (Cornwall), Institute
*Sevenoaks, Literary and Scientific Institution
*Shaftesbury, Literary Institution
*Sheerness, Mechanics' Institution
*Sheffield, People's College
*Shelton (near Newcastle-under-Lyne), Potteries Mechanics' Institution
*Sherborne, Literary Institution
*Shiffnall, Mechanics' Institution
*Shrewsbury, Church of England Literary and Scientific Institution
* ,, Shropshire Mechanics' Institution
Sleaford, Public Library
Slough, Mechanics' Institution
*Southam, Mutual Improvement Society
*Southampton, Polytechnic Institution
Spalding, Mechanics' Institute
Spilsby, Literary and Scientific Institution
Staines, Literary and Scientific Institution
*Staley-bridge, Mechanics' Institution
Stamford, Institution
*Stirling, School of Arts
*Stockton-on-Tees, Mechanics' Institute of Literature and Science
Stoke-upon-Trent, Athenæum
Stourbridge, Mechanics' Institution
Sudbury, Literary Institution and Museum
Swansea, Royal Institution of South Wales

Tamworth, Reading Room
Tenterden, Athenæum
* ,, Mutual Improvement Society
*Tewkesbury, Mechanics' Institution
*Thame, Institute
*Tiverton, Literary and Scientific Institution
Tottenham and Edmonton, Literary and Scientific Institution
Tottington, (near Bury, Lancashire), Mutual Improvement Society
*Trowbridge, Mechanics' Institution
*Truro, Literary and Scientific Institution
*Tunbridge, Society of Literary and Scientific Enquirers
Tunbridge Wells, Useful Knowledge Institution
*Tyldesley (near Manchester), Mechanics' Institution and Mutual Improvement Society

Uttoxeter, Literary and Scientific Institution
*Uxbridge, Literary and Mutual Improvement Society

Ventnor and Bonchurch, Literary and Scientific Institution

*Wandsworth, Literary and Scientific Institution
Wantage, Alfred Literary and Scientific Institution
Ware, Institute
*Wareham, Mutual Improvement Society
Warminster, Athenæum
*Warrington, Mechanics' Institution
* ,, Museum and Library
*Warwick, Athenæum
*Wednesbury, Mechanics' Institution
*Wellingborough, Mechanics' Institution
* ,, Parochial Lending-library and Reading-room
Wellington, (Somerset), Literary Society
*Welshpool, Reading Society
Wenlock, Agricultural Reading Society
*West Bromwich, Institution for Advancement of Knowledge
Westerham, Literary Institute
Weston-super-Mare, Athenæum
*Whitby, Institute
*Whitchurch (Salop), Mechanics' Institution
*Whitehaven, Mechanics' Institution
*Wimborne Minster, Society for the Acquirement of Useful Knowledge

*Winchester, Mechanics' Institution
*Windsor and Eton, Literary, Scientific and Mechanics' Institution
*Wirksworth, Mechanics' Institution
Wisbech, Mechanics' Institute
Wiveliscombe (Somerset), Mutual Improvement Society
*Woburn, Literary and Scientific Institution
Wolsingham, Mechanics' Institute and Literary Society
Wolverhampton, Athenæum and Mechanics' Institute
Wordsley, Library and Reading Association
*Workington, Mechanics' Institution
Worksop, Reading Society and Mechanics' Institution
Wrexham, Literary Institute
*Wrington (near Bristol), Literary Society

Yarmouth, Great, and Southtown, Young Man's Institute
* ,, Parochial Library and Museum.
*Yeovil, Mutual Improvement Society
*York, Institute of Popular Science and Literature.

ALSO

Hull, Chamber of Commerce and Shipping
Liverpool, Chamber of Commerce

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